V28021

Report Number NCAP-TRC-98-006

New Car Assessment Program (NCAP)

Flat Frontal Barrier Impact Test

General Motors Corp.

1998 Oldsmobile Intrigue

4-Door Sedan

NHTSA Number: MW0110

TRC Test Number: 980221

Prepared By:

Transportation Research Center Inc.

10820 State Route 347

East Liberty, OH 43319

February 21, 1998

Final Report

Prepared For:

U. S. Department of Transportation

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Performance Standards,

Office of Crashworthiness Standards,

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400 Seventh Street, S.W., Room 5315

Washington, DC 20590

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Report prepared by:

Allison E. Louden Date 4/6/98

Allison E. Louden, Project Engineer
Transportation Research Center Inc.

Report approved by:

Jeffery W. Sankey Date 4/6/98

Jeffery W. Sankey, Manager, Project Operations
Transportation Research Center Inc.

Final report accepted by:

____________________ Date __________

Manager, New Car Assessment Program
NHTSA, Office of Market Incentives

____________________ Date __________

Contracting Officer's Technical Representative (COTR),
NHTSA, Office of Market Incentives

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16. Abstract

A 56 kph (35 mph) flat frontal barrier impact test was conducted on a 1998 Oldsmobile Intrigue 4-door sedan, NHTSA No. MW0110, at Transportation Research Center Inc. on February 21, 1998. This test was conducted in accordance with Office of Crashworthiness Standards NCAPTP090196 for the determination of vehicle crashworthiness. The barrier impact velocity was 56.1 kph. The vehicle's maximum static crush was 595 millimeters. The ambient temperature was 20° C.

The driver's Head Injury Criteria (HIC) was 589. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 46.9 g. The driver's maximum chest deflection was 33 millimeters. The driver's left and right femur maximum axial forces were 4207 N and 2727 N, respectively.

The passenger's HIC was 1139. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.8 g. The passenger's maximum chest deflection was 35 millimeters. The passenger's left and right femur maximum axial forces were 3340 N and 3210 N, respectively.

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Section 1.0

Purpose and Test Procedure

Purpose

This 56 kph (35 mph) frontal barrier impact test is part of the New Car Assessment Program (NCAP) conducted for the National Highway Traffic Safety Administration's (NHTSA) Office of Crashworthiness Standards by Transportation Research Center Inc. (TRC) under Contract Number DTNH22-96-D-22010.

The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for the subject vehicle, a 1998 Oldsmobile Intrigue 4-door sedan, NHTSA Number MW0110, at an impact speed of 56.1 kph (34.9 mph) FMVSS 208, 212, 219, and 301 requirements.

Test Procedure

This 56 kph (35 mph) test was conducted in accordance with NHTSA's Office of Crashworthiness Standards Laboratory Indicant Test Procedure, NCAPTP090196. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle was instrumented with nine (9) accelerometers to measure longitudinal axis accelerations. The driver's and passenger's restraint systems were instrumented with load cells to measure lap and shoulder belt forces and potentiometers to measure shoulder belt stretch and spoolout. The vehicle impacted a flat frontal barrier. The vehicle's specified impact velocity range was 55.5 to 57.1 kph.

The test vehicle contained two (2) Part 572E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedures specified in Appendix B of the Laboratory Indicant Test Procedure. This test was the third use of the driver dummy and the first use of the passenger dummy.

Both dummies were instrumented with primary and redundant head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. The dummies were also instrumented with neck moment and force load cells, chest deflection potentiometers, foot accelerometers to measure longitudinal and vertical axis accelerations, and upper and lower tibia load cells to measure forces and moments.

The ninety-seven (97) data channels were digitally sampled and recorded at 12,500 samples per second and processed per Section 11.13 of the Laboratory Indicant Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and fourteen (14) high-speed motion picture cameras. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera.

The vehicle and occupant data are presented in Section 2.0. The occupant, camera, and vehicle measurements are presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the dummy certification data. Appendix D contains miscellaneous test information. Appendix E contains the restraint system instructions from the owner's manual.

Section 2.0

Frontal Barrier Impact Test Summary

Test Results Summary

This flat frontal barrier test was conducted at TRC on February 21, 1998.

The test vehicle, a 1998 Oldsmobile Intrigue 4-door sedan, NHTSA Number MW0110, was equipped with a 3.8-liter inline engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 1761.8 kg. The vehicle's impact speed was 56.1 kph. The vehicle sustained 595 mm of static crush during the impact.

The driver's Head Injury Criteria (HIC) was 589. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 46.9 g. The driver's maximum chest deflection was 33 mm. The driver's left and right femur maximum axial forces were 4207 N and 2727 N, respectively.

The right front passenger's HIC was 1139. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.8 g. The passenger's maximum chest deflection was 35 mm. The passenger's left and right femur maximum axial forces were 3340 N and 3210 N, respectively.

There was no loss of windshield periphery retention.

There was no penetration through the windshield.

Following the impact, no fluid spilled from the vehicle's fuel system prior to the static rollover test or during the static rollover test.

Data Acquisition Explanations

The driver dummy's shoulder belt potentiometer displacement, SHBD1, never returned to zero.

The driver dummy's seat belt extension data channel, SBED1, never returned to zero.

The passenger dummy's seat belt extension potentiometer, SBED2, went open between 90 to 112 milliseconds.

Table 1 Crash Test Summary

NHTSA number:	MW0110	
Test type:	Flat Frontal Barrier	
Test date:	02/21/98	
Test time:	1448	
Ambient temperature:	20° C	
Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan	
Vehicle test weight:	1761.8 kg	
Impact angle[1]:	0°	
Impact velocity[2]:	Primary = 56.1 kph Secondary[3] = N/A	
Maximum static crush:	595 mm	
Average rebound:	635 mm	
Dummies:	Driver #192	Passenger #142
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag and 3-point unibelt	Airbag and 3-point unibelt
Number of data channels:	40	40
Number of cameras:	High-speed 14 Real-time 1	

[1] With respect to tow track centerline.
[2] Speed trap measurement (± .08 kph accuracy)
[3] The backup light trap did work correctly.

Table 2 Test Vehicle Information

Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan
Color:	Black
VIN:	1G3WH52K4WF350882
NHTSA number:	MW0110
Engine data:	
Placement:	inline
Cylinders:	6
Displacement	3.8 liters
Transmission data:	_4_ speed, ___manual, _X_ automatic, ___overdrive
	_X_ FWD, ___RWD, ___4WD ___AWD
Date vehicle received:	01/27/98
Odometer reading:	39
Dealer's name and address:	Dublin Oldsmobile/GM 2539 Billingsley Road, Columbus, OH 43235

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	No	Tilting steering wheel	Yes
Power windows	Yes	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes

Other: Two front and two rear cup holders, remote keyless entry, map pockets

Certification data from vehicle's label:

Vehicle manufactured by:	General Motors Corp.
Date of manufacture:	12/97
VIN:	1G3WH52K4WF350882
GVWR:	4378 lbs.
GAWR: Front:	2414 lbs.
Rear:	1964 lbs.

Table 2 Test Vehicle Information, Cont'd.

Size of tires:	Goodyear Eagle LS, P225/60R16
Tire pressure with maximum capacity vehicle load:	
Front:	30 psi
Rear:	30 psi
Spare tire:	Goodyear Temp, T125/70D15
Type of front seats:	Bucket
Type of rear seats:	Bench

Tire & capacity data from vehicle's label:

Recommended tire size:	195/60R15
Recommended cold tire pressure:	
Front:	30 psi
Rear:	30 psi

Designated seating capacity:

Front	2
Rear	3
Total	5

Vehicle capacity weight: 416 kg

Test vehicle attitude:

Delivered attitude:	LF 735 mm;	RF 725 mm;	LR 748 mm;	RR 733 mm
Pre-test attitude:	LF 706 mm;	RF 697 mm;	LR 692 mm;	RR 684 mm
Post-test attitude:	LF 776 mm;	RF 728 mm;	LR 679 mm;	RR 680 mm

Table 2 Test Vehicle Information Cont'd

Weight of test vehicle as received (with maximum fluids):

Right front	489.4 kg	Right rear	292.6 kg
Left front	493.1 kg	Left rear	266.7 kg
Total front weight	982.5 kg	(63.7% of total vehicle weight)	
Total rear weight	559.3 kg	(36.3% of total vehicle weight)	
Total delivered weight	1541.8 kg		

Calculation of test vehicle's target test weight:

RCLW[1] = Rated cargo and luggage weight

UDW = Unloaded delivered weight (1541.8 kg)

VCW = Vehicle capacity weight (416 kg)

DSC = Designated seating capacity (5)

RCLW[1] = VCW - 68 (DSC) = 416 - 68(5) = 76 kg

Target test weight = UDW + RCLW[1] + (Number of Hybrid III dummies x 76 kg/dummy)

Target test weight = 1541.8 + 76 + 152 kg

Target test weight = 1769.8 kg

Weight of test vehicle with required dummies and 68 kg of cargo weight:

Right front	531.6 kg	Right rear	364.7 kg
Left front	517.6 kg	Left rear	347.9 kg
Total front weight	1049.2 kg	(59.6% of total vehicle weight)	
Total rear weight	712.6 kg	(40.4% of total vehicle weight)	
Total test weight	1761.8 kg	(0.4% under target test weight)	

Weight of ballast secured in vehicle: None

Components removed to meet target test weight: Onboard cameras, lights, and battery.

CG rearward of front wheel centerline: 1120 mm

[1] Cargo weight for multipurpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 136 kilograms, whichever is less.

Table 3 Post-Impact Data

Test number:	980221
NHTSA number:	MW0110
Test date:	02/21/98
Test time:	1448
Test type:	Flat frontal barrier
Impact angle:	0°
Ambient temperature at impact area:	20° C
Temperature in occupant compartment:	21° C
Impact velocity:	
Primary	56.1 kph
Secondary	N/A
Specified range	N/A

Distance from vehicle to barrier:

Entering velocity trap	381 mm
Exiting velocity trap	51 mm

Test vehicle static crush:

Overall length of test vehicle:

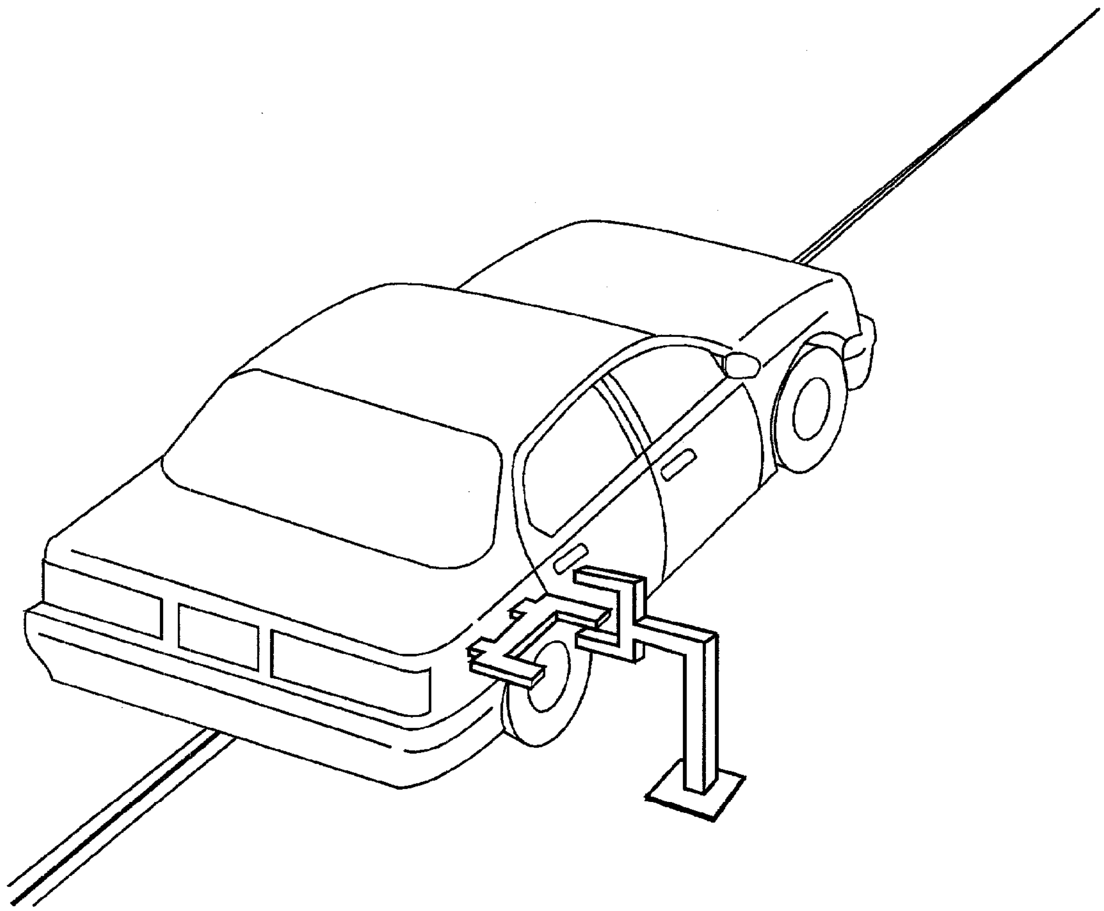
Pre-test:	L	4800 mm;	C	5012 mm;	R	4812 mm
Post-test:	L	4300 mm;	C	4400 mm;	R	4434 mm
Total crush:	L	500 mm;	C	612 mm;	R	378 mm
Average crush:	497 mm					

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L	697 mm;	C	682 mm;	R	525 mm
Average rebound	635 mm					

Figure 1 Impact Velocity Measurement System

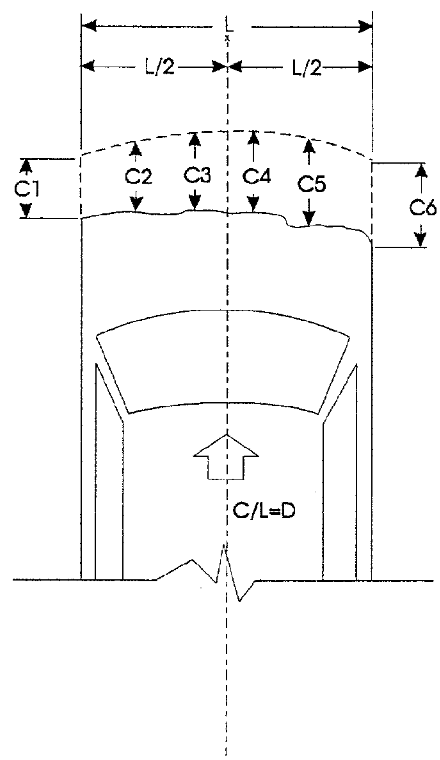


The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

Figure 2 Accident Investigation Division Data
for 56 kph (35 mph) Frontal Barrier Impact

NHTSA number:	MW0110
Test date:	02/21/98
Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan
Vehicle size category:	Sedan
VIN:	1G3WH52K4WF350882
Build date:	12/97
Test weight:	1761.8 kg
Vehicle wheelbase:	2769 mm
Maximum width:	1860 mm
Front overhang:	1082 mm



Collision Deformation Classification (CDC) code: 12FDEW3

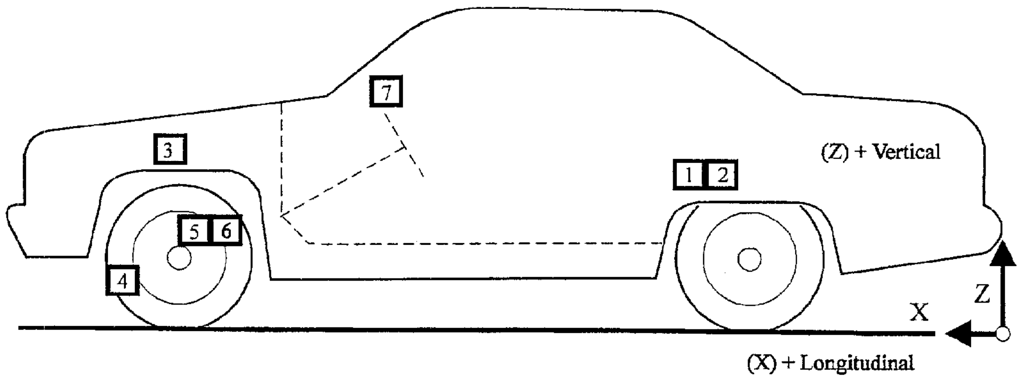
Crush depth measurements:

C1	=	500 mm
C2	=	571 mm
C3	=	595 mm
C4	=	567 mm
C5	=	495 mm
C6	=	378 mm

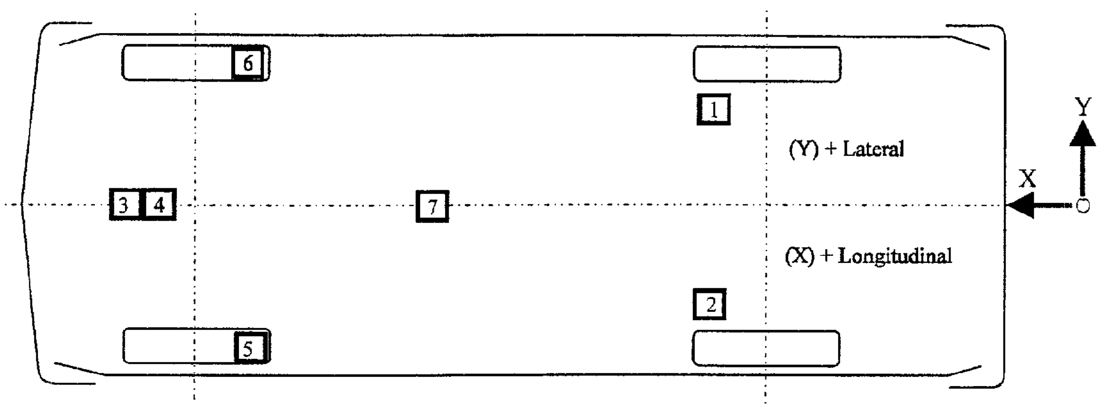
Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 1524 mm

Figure 3 Vehicle Accelerometer Placement



Side View



Bottom View

Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 980221 No. LOCATION		X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT	PRE	1957 mm	260 mm	406 mm		
CROSSMEMBER	POST	1957 mm	260 mm	451 mm		
LONGITUDINAL					3.6 g @ 149.6 ms	33.0 g @ 57.2 ms
REDUNDANT					3.7 g @ 149.5 ms	32.6 g @ 57.1 ms
2 RIGHT REAR SEAT	PRE	1957 mm	-275 mm	406 mm		
CROSSMEMBER	POST	1957 mm	-275 mm	431 mm		
LONGITUDINAL					3.1 g @ 149.4 ms	25.1 g @ 57.8 ms
REDUNDANT					3.6 g @ 149.4 ms	29.5 g @ 57.8 ms
3 ENGINE TOP	PRE	4133 mm	20 mm	850 mm		
	POST	3885 mm	-19 mm	791 mm		
LONGITUDINAL					55.1 g @ 56.2 ms	121.1 g @ 39.6 ms
4 ENGINE BOTTOM	PRE	4121 mm	-53 mm	183 mm		
	POST	3962 mm	-31 mm	201 mm		
LONGITUDINAL					35.4 g @ 56.3 ms	94.7 g @ 41.0 ms
5 RIGHT BRAKE CALIPER	PRE	3990 mm	-670 mm	331 mm		
	POST	3828 mm	-731 mm	349 mm		
LONGITUDINAL					77.2 g @ 58.7 ms	20.3 g @ 80.9 ms

Table 4 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 980221 No. LOCATION		X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
6 LEFT BRAKE CALIPER	PRE	3990 mm	670 mm	331 mm		
	POST	3841 mm	710 mm	349 mm		
LONGITUDINAL					93.7 g @ 51.0 ms	17.8 g @ 77.3 ms
7 INSTRUMENT PANEL	PRE	3412 mm	-35 mm	940 mm		
CENTER	POST	3466 mm	-50 mm	1022 mm		
LONGITUDINAL					22.2 g @ 36.5 ms	51.8 g @ 74.4 ms

REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

Table 5 Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	Driver #192	Passenger #142
Head	Airbag	Airbag
Chest	Airbag	Airbag
Abdomen	None	None
Left knee	Instrument panel	Instrument panel
Right knee	Instrument panel	Instrument panel

Door Opening:

	Left	Right
Front	Easy	Easy
Rear	Easy	Easy

Seat Movement:

	Seat Back Failure	Seat Shift
Front	None	None
Rear	NA	NA

Glazing Damage: The left portion of glass was cracked on impact.

Other Notable Impact Effects: None

Table 6 FMVSS 208 Data Summary

Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan
Vehicle NHTSA number:	MW0110
Test date:	02/21/98

	Driver Dummy #192		Passenger Dummy #142	
Maximum Accelerations:				
Head X-axis	-52.3	g	-73.1	g
Head Y-axis	5.2	g	20.5	g
Head Z-axis	-28.3	g	-41.7	g
Head resultant	58.6	g	82.8	g
Chest X-axis	-47.7	g	-44.9	g
Chest Y-axis	-3.5	g	5.9	g
Chest Z-axis	8.8	g	-20.9	g
Chest resultant[1]	46.9	g	48.8	g
Chest resultant time interval[1]	.003	sec	.003	sec
Head Injury Criteria (HIC) Values:				
HIC[2]	589		1139	
HIC starting time	.060	sec	.070	sec
HIC ending time	.096	sec	.099	sec
Average head resultant acceleration during HIC time interval	48.4	g	68.6	g
Maximum Chest Deflections:				
Chest X-axis	-33	mm	-35	mm
Maximum chest deflection time	.082	sec	.092	sec
Maximum Compressive Femur Forces:				
Left femur	-4207	N	-3340	N
Right femur	-2727	N	-3210	N
Maximum Seat Belt Forces:				
Lap belt	4502	N	4244	N
Shoulder belt	6991	N	3564	N

Note: All values listed must be occurring during primary impact event. (Head accelerations listed must be during HIC time interval.)

[1] 0.003 Sec. Minimum duration.
[2] The maximum HIC time interval is 36 milliseconds.

Table 7 Hybrid III Data Summary

Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan
Vehicle NHTSA number:	MW0110
Test date:	02/21/98

	Driver Dummy #192	Passenger Dummy #142
Maximum Forces		
Neck X-axis shear force	-287 N	-847 N
Neck Y-axis shear force	100 N	133 N
Neck Z-axis axial force	1588 N	1153 N
Maximum Moments		
Neck moment about X-axis	10.0 N·m	-18.5 N·m
Neck moment about Y-axis	42.6 N·m	85.0 N·m
Neck moment about Z-axis	7.8 N·m	28.5 N·m
Maximum Accelerations:		
Pelvis X-axis	-17.1 g	-56.7 g
Pelvis Y-axis	10.1 g	5.1 g
Pelvis Z-axis	54.8 g	11.1 g
Pelvis resultant	57.0 g	57.4 g

Table 7 Hybrid III Data Summary, Cont'd.

Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan
Vehicle NHTSA number:	MW0110
Test date:	02/21/98

	Driver Dummy #192	Passenger Dummy #142
Left upper tibia moment about X-axis	-92.8 N·m	-96.2 N·m
Left upper tibia moment about Y-axis	-67.1 N·m	164.1 N·m
Right upper tibia moment about X-axis	73.3 N·m	49.0 N·m
Right upper tibia moment about Y-axis	175.4 N·m	73.1 N·m
Left lower tibia X-axis force	-603 N	-1104 N
Left lower tibia Z-axis force	-2099 N	-3659 N
Left lower tibia moment about Y-axis	41.9 N·m	76.0 N·m
Right lower tibia X-axis force	-1118 N	-515 N
Right lower tibia Z-axis force	-3783 N	-2980 N
Right lower tibia moment about Y-axis	72.7 N·m	41.2 N·m
Left foot X-axis acceleration	-36.6 g	-85.4 g
Left foot Z-axis acceleration at heel	48.4 g	45.9 g
Left foot Z-axis acceleration at toe	81.8 g	-80.4 g
Right foot X-axis acceleration	-128.7 g	-46.5 g
Right foot Z-axis acceleration at heel	50.1 g	43.7 g
Right foot Z-axis acceleration at toe	123.6 g	60.4 g

Note: All values listed must be occurring during primary impact event.

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest were restrained by the driver's airbag as the dummy's torso was restrained by the three-point unibelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the three-point unibelt.

Right Front Passenger Dummy

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward as the dummy's head and chest were restrained by the passenger's airbag and the dummy's torso was restrained by the three-point unibelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated upright in the right front passenger's seat, restrained by the three-point unibelt.

Table 8 Seat Belt Performance Assessment Test Data

	Driver	Passenger
Belt length data:		
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	2575 mm	2590 mm
Shoulder belt length as measured on Part 572 dummy.	830 mm	885 mm
Lap belt length as measured on Part 572 dummy.	748 mm	750 mm
Shoulder belt spool-off length:		
As determined by film analysis[1]	N/A	N/A
As determined mechanically	90 mm	81 mm
As determined electronically[2]	93 mm	92 mm
Belt stretch length:		
As measured mechanically	0 mm/m	0 mm/m
As measured electronically[2]	0 mm/m	0 mm/m
Retractor lock-up time:		
As determined by shoulder belt spool-off[1]	N/A	N/A

[1] There were no onboard cameras.
[2] See Data Acquisition Explanations

Section 3.0

FMVSS 212, 219 (partial), and 301 Data

Figure 4 FMVSS 212 Test Data

Details of windshield mounting such as retention method, trim type, etc.: Plastic trim around outer perimeter, adhesive trim around inner perimeter.

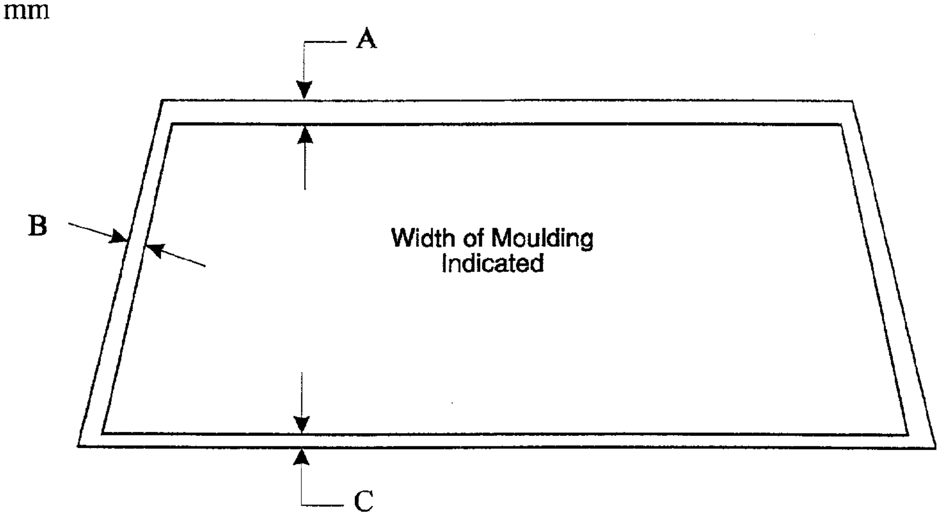
FMVSS 212 requirements: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

Windshield periphery measurements:

	Pre-test	Post-test	Percent retention
Right side	2205 mm	2205 mm	100
Left side	2205 mm	2205 mm	100
Total	4410 mm	4410 mm	100

Pre-test windshield mounting material temperature: 20° C

A = 17 mm
B = 17 mm
C = 11 mm



Front view of windshield[1]

Loss of windshield retention lengths: None

[1] Indicate areas of loss of retention, if any, on windshield diagram.

Figure 5 FMVSS 219 Test Data

Protected zone lower edge requirement:

The lower edge of the protected zone is determined by placing a 165-millimeter diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 13 millimeters from the locus line. The **lower edge of the protected zone** is the longitudinal projection onto the outer surface of the windshield of this line.

Windshield measurements:

A = 1170 mm

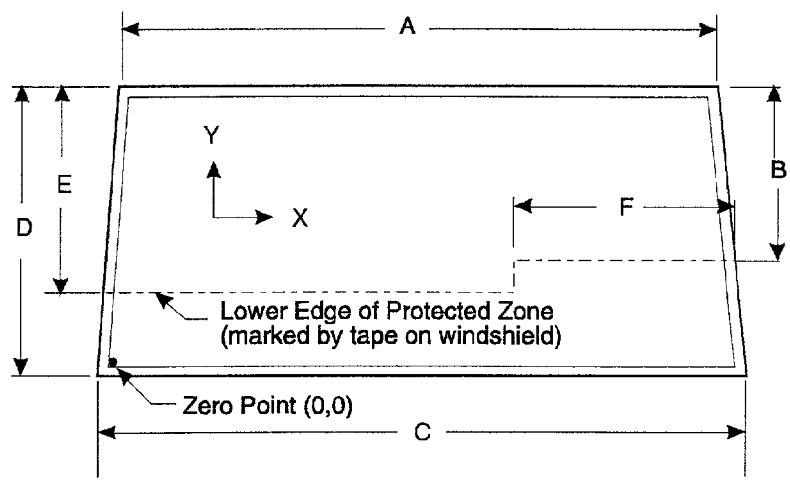
B = 535 mm

C = 1745 mm

D = 755 mm

E = 525 mm

F = 630 mm



FRONT VIEW

Method of adhering protected zone template to windshield: NA

Areas of windshield template penetration greater than 6 mm: NA

	Coordinates X	Y
1.		
2.		
3.		

Areas of windshield penetration, below the protected zone, through the inner surface of the windshield: None

1.
2.
3.

Table 9 Fuel System Data

Vehicle year/make/ model/body style:	1998/Oldsmobile/Intrigue/4-door sedan
NHTSA number:	MW0110
Fuel system capacity:	67.2 liters (from owner's manual)
Usable capacity:	67.2 liters (furnished by COTR)
Test volume range:	61.8 liters to 63.2 liters (92-94% of usable)
Actual test volume:	62.5 liters (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	Purple
Did electric fuel pump operate with ignition switch "on" and the engine not operating.	Yes
Details of fuel system:	The fuel tank was located in front of the rear axle. The fuel filler neck was located on the left side and entered the rear of the fuel tank. The fuel lines ran up the left side of the vehicle.

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: MW0110

Test date: 02/21/98

Vehicle year/make/
model/body style: 1998/Oldsmobile/Intrigue/4-door sedan

Test requirements:

Test vehicle fuel tank filled to 92 to 94% of manufacturer's usable capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

Test vehicle impact type:

_x_ Frontal (_57_ kph)

___ Oblique (48 kph) with __° barrier face first contacting ___ (driver/pass.) side

___ Rear moving barrier (48 kph)

___ Lateral moving barrier (32 kph)

Fuel system fluid spillage measurements:

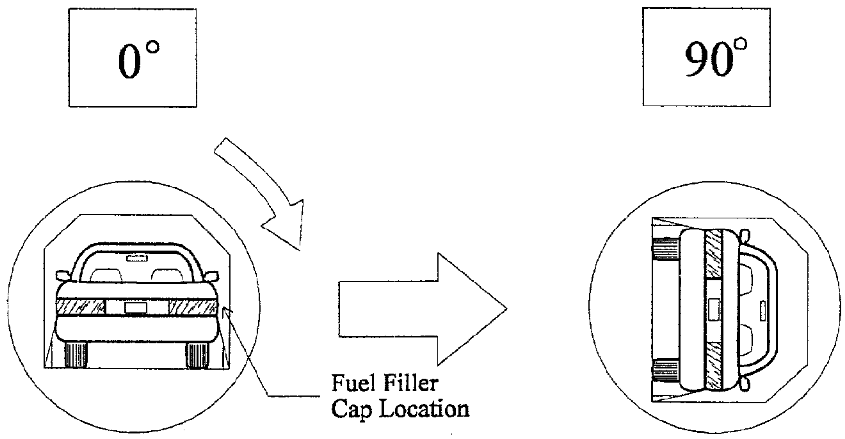
		Test Results	Maximum Allowable
1.	From impact until vehicle motion ceases	0 g	28 g
2.	5-minute period after vehicle motion ceases	0 g	142 g
3.	Next 25 minutes after 5-minute period	0 g	28 g/min

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: MW0110

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2 minutes,	0 seconds
FMVSS 301 position hold time	=	5 minutes,	0 seconds
Total	=	7 minutes,	0 seconds
Next whole minute interval	=	7 minutes	

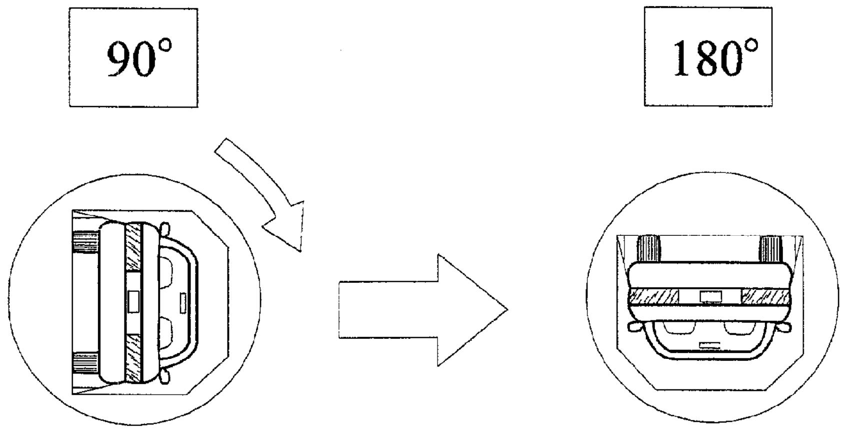
Fuel system fluid spillage measurements:

0° to 90° rotation (fuel filler cap down)	Test Results	Maximum Allowable
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	14	minutes		

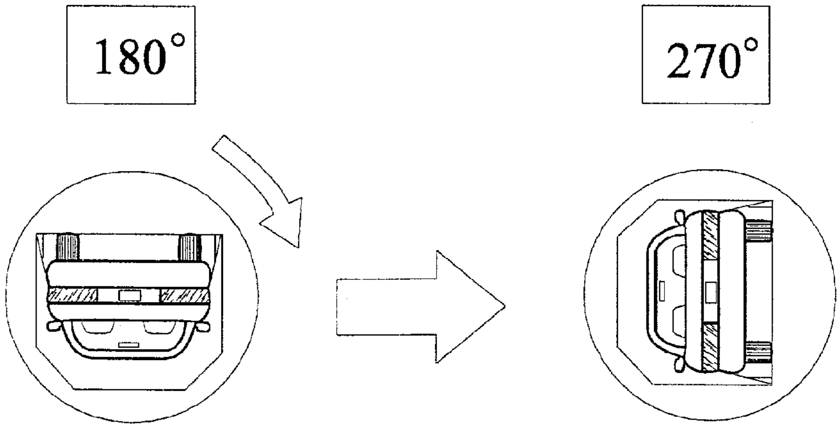
Fuel system fluid spillage measurements:

90° to 180° rotation		Test Results	Maximum Allowable
1.	First five minutes from onset of rotation	0 g	142 g
2.	Sixth minute from onset of rotation	0 g	28 g
3.	Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	21	minutes		

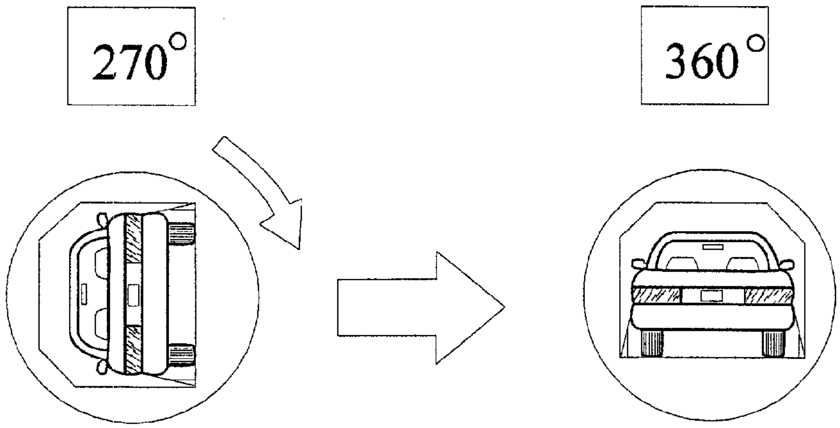
Fuel system fluid spillage measurements:

180 to 270° rotation	Test Results	Maximum Allowable
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	28	minutes		

Fuel system fluid spillage measurements:

270° to 360° rotation		Test Results	Maximum Allowable
1.	First five minutes from onset of rotation	0 g	142 g
2.	Sixth minute from onset of rotation	0 g	28 g
3.	Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Section 4.0

Occupant, Camera, and Vehicle Information

Figure 7 Dummy Measurement Locations for Front Seat Occupants

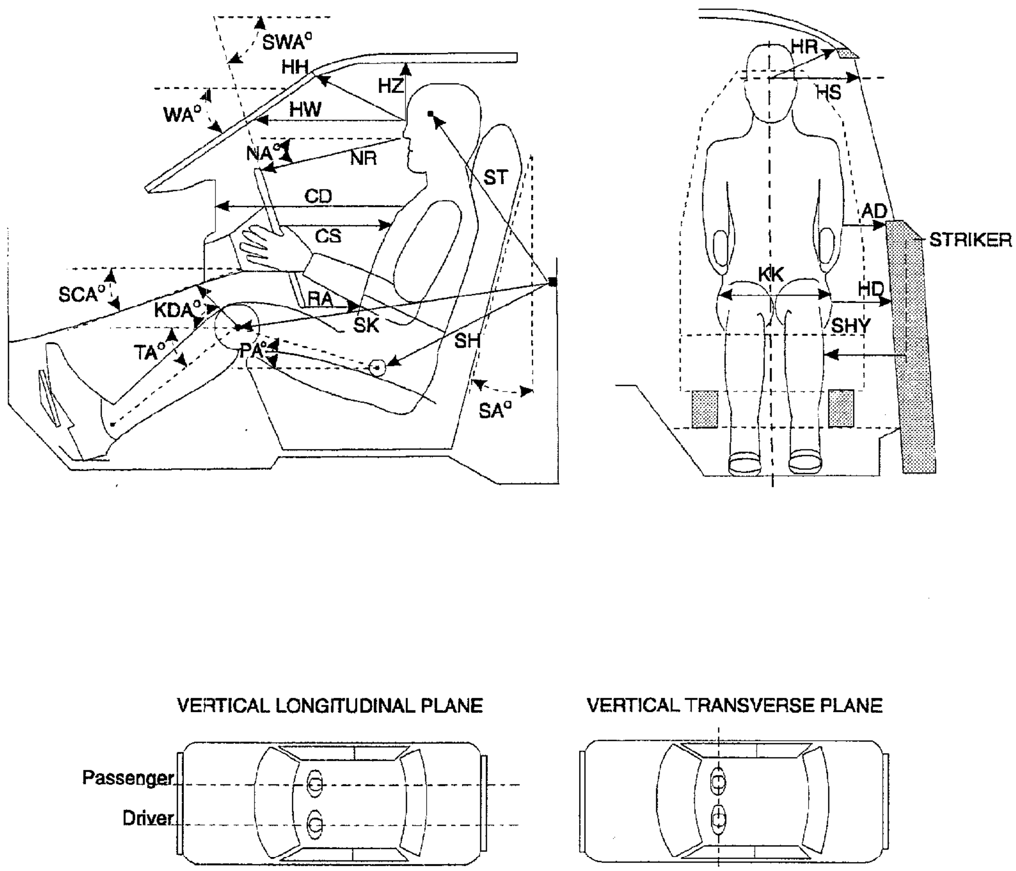


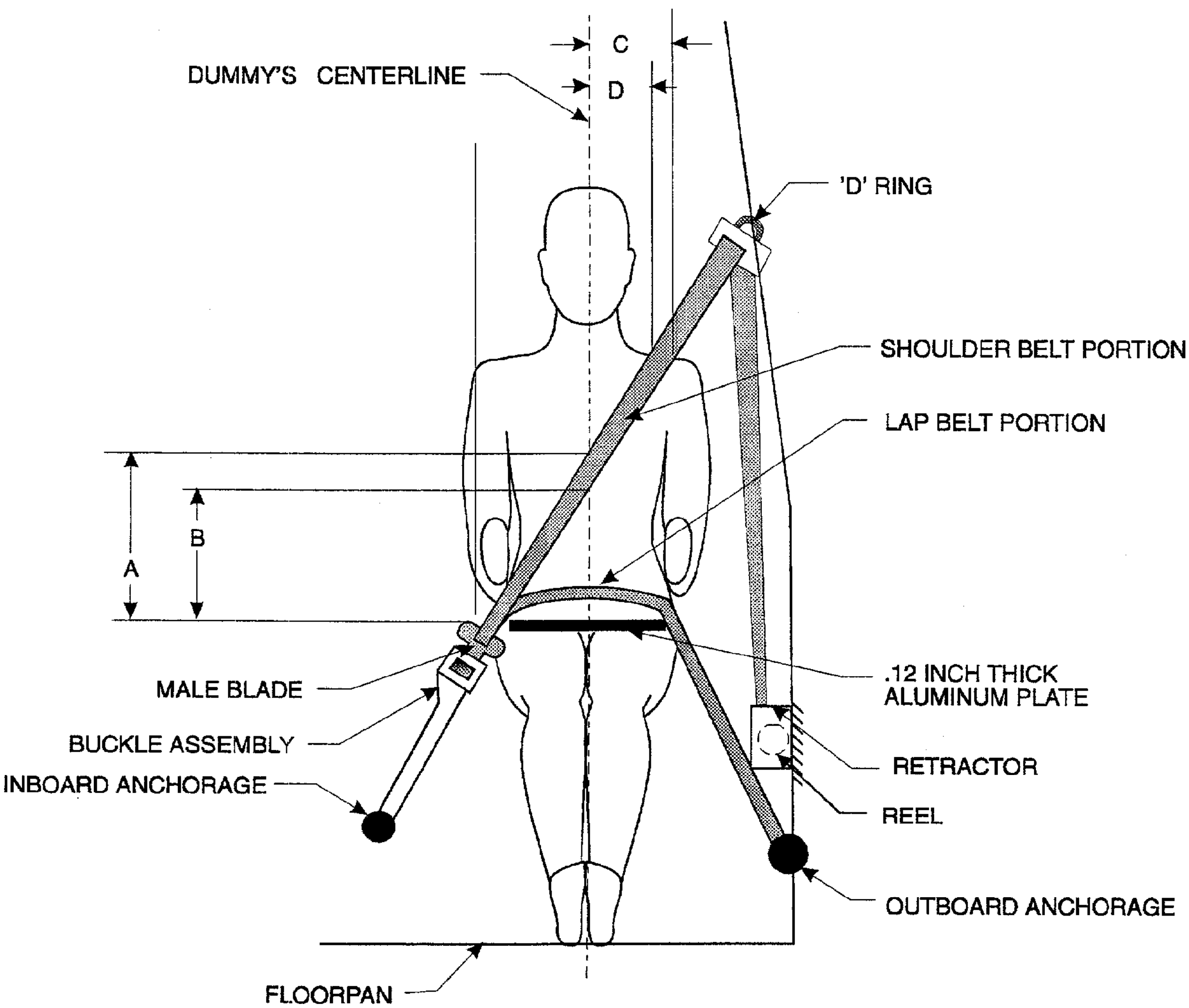
Table 11 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #192)	Passenger (Serial #142)
WA	Windshield angle	26°	26°
SWA	Steering wheel angle	69°	NA
SCA	Steering column angle	21°	NA
SA	Seat back angle	26.5°	26.5°
HZ	Head to roof	163 mm	165 mm
HH	Head to header	320 mm	295 mm
HW	Head to windshield	581 mm	545 mm
HR	Head to side header	200 mm	209 mm
NR	Nose to rim	367 mm	NA
NA	Nose to rim angle	12°	NA
CD	Chest to dash	535 mm	478 mm
CS	Steering wheel to chest	307 mm	NA
RA	Rim to abdomen	188 mm	NA
KDL	Left knee to dash	182 mm	156 mm
KDR	Right knee to dash	185 mm	149 mm
KDA	Outboard knee to dash angle	32°	32°
PA	Pelvic angle	24.5°	20.5°
TA	Tibial angle	40°	42°
KK	Knee to knee	372 mm	273 mm
ST[1]	Striker to head	572 mm	564 mm
	Striker to head angle	-84°	-81°
SK[1]	Striker to knee	541 mm	562 mm
	Striker to knee angle	-5°	-4°
SH[1]	Striker to H-point	196 mm	218 mm
	Striker to H-point angle	25°	24°
SHY	Striker to H-point (Y dir.)	240 mm	221 mm
HS	Head to side window	303 mm	290 mm
HD	H-point to door	159 mm	118 mm
AD	Arm to door	130 mm	120 mm

The seat back angle (SA°) is measured relative to vertical, all other angles are measured relative to horizontal.

[1] A negative angle indicates the measurement point was above the striker.

Figure 8 Seat Belt Positioning Data



	Driver	Passenger
A - Top surface of aluminum plate to belt upper edge	335 mm	328 mm
B - Top surface of aluminum plate to belt lower edge	214 mm	245 mm
C - Dummy centerline to intersection of upper torso belt and lap belt	121 mm	96 mm
D - Dummy centerline to inner edge of belt at chest flesh top	67 mm	40 mm
Lap belt tension (N)	4 N	4 N
Should belt tension (N)	4 N	4 N

Figure 9 Camera Positions

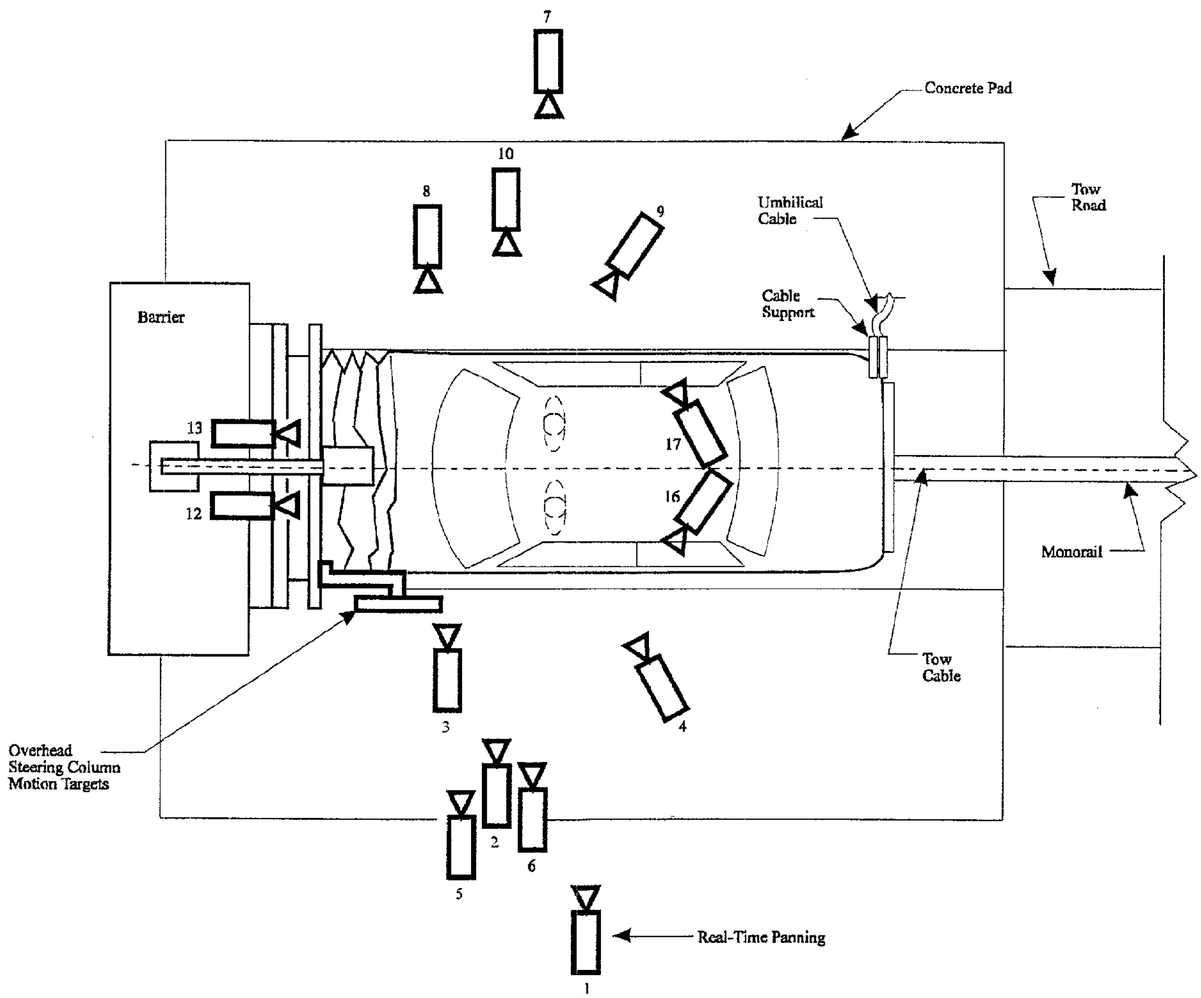


Figure 9 Camera Positions, Cont'd.

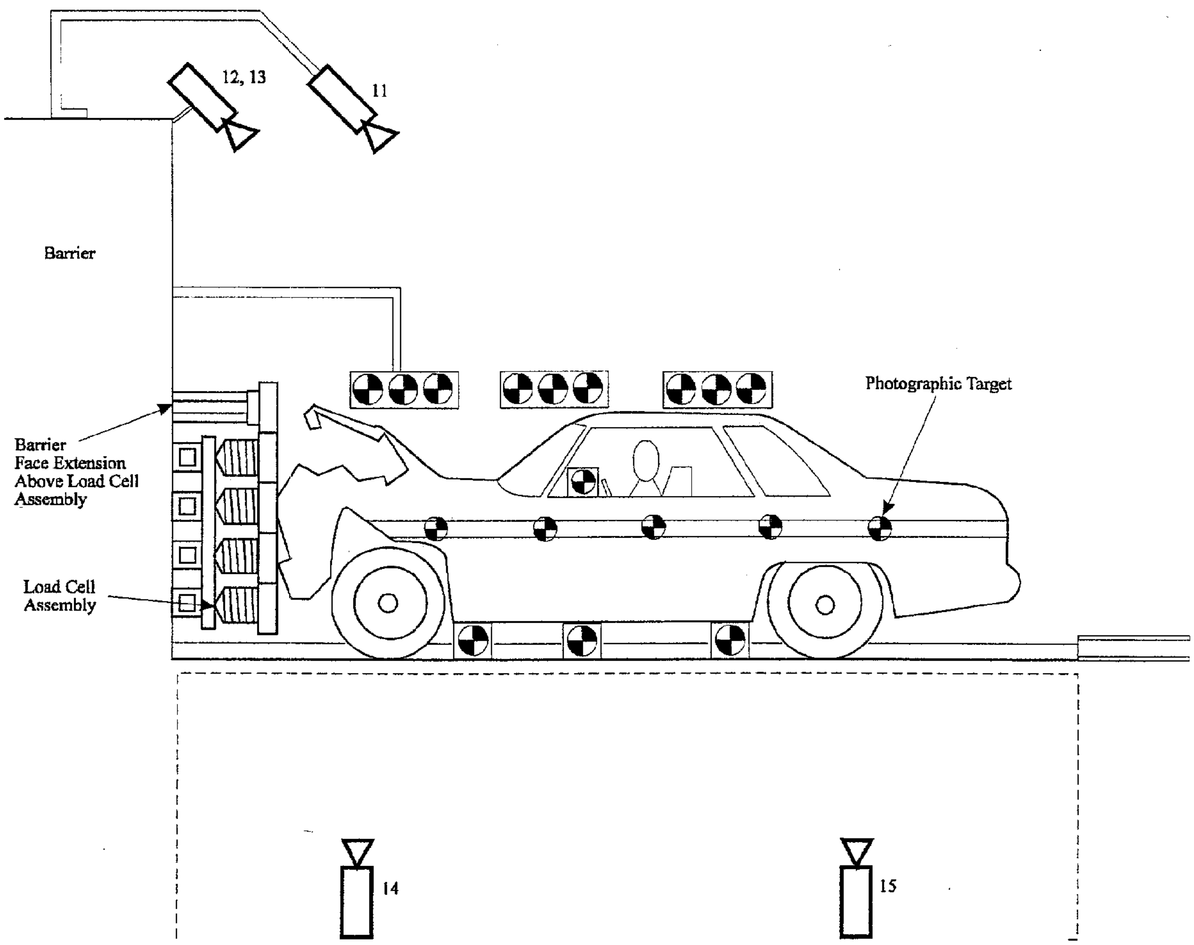


Table 12 Motion Picture Camera Locations

Test Number: 980221

Vehicle Year/Make/Model/Body Style: 1998/Oldsmobile/Intrigue/4-door sedan

Camera Number	View	Camera Positions[1] X	Y	Z	Angle[2]	Film Plane to Head Target	Lens	Film Speed
1	Real-time panning	-3607 mm	2802 mm	1549 mm	NA	NA	16 mm	24 frames/s
2	Left Barrier to seat back	-4572 mm	7925 mm	2591 mm	-27°	7315 mm	25 mm	995 frames/s
3	Left windshield intrusion	-1346 mm	7859 mm	1074 mm	0°	NA	50 mm	1010 frames/s
4	Dummy angled view	-1054 mm	2438 mm	1118 mm	-12°	1829 mm	25 mm	1000 frames/s
5	Column movement - upper	-3658 mm	8839 mm	2616 mm	-14°	NA	25 mm	1005 frames/s
6	Column movement - lower	-3658 mm	8839 mm	1908 mm	-9°	NA	25 mm	1000 frames/s
7	Right side overall	-2065 mm	-6767 mm	942 mm	-2°	NA	13 mm	998 frames/s
8	Right windshield intrusion	-968 mm	-7775 mm	1118 mm	0°	NA	50 mm	1002 frames/s
9	Passenger angled view	-986 mm	-2438 mm	1151 mm	7°	1829 mm	25 mm	998 frames/s
10	Right medium tight	-4674 mm	7315 mm	2540 mm	-26°	6706 mm	25 mm	1015 frames/s
11	Windshield - barrier center	-925 mm	0 mm	2489 mm	-40°	NA	8 mm	1008 frames/s
12	Driver - barrier view	-173 mm	368 mm	2159 mm	-41°	NA	17 mm	998 frames/s
13	Passenger - barrier view	-114 mm	-351 mm	2159 mm	-40°	NA	17 mm	998 frames/s
14	Crush & fluid spillage - front pit	-1283 mm	0 mm	-2347 mm	90°	NA	13 mm	1000 frames/s
15	Fluid spillage - rear pit	-2522 mm	0 mm	-2515 mm	90°	NA	13 mm	995 frames/s

[1] +X = Film plane forward of barrier face
+Y = Film plane to left of monorail centerline
+Z = Film plane above ground level

[2] +Angle = Film plane angled upward from horizontal plane

Figure 10 Vehicle Target Locations

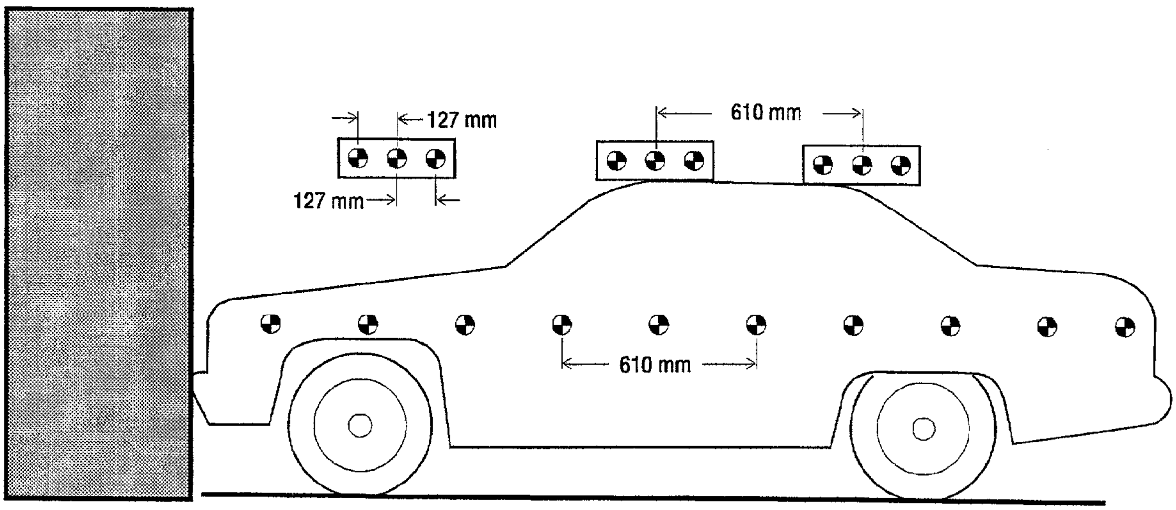


Figure 11 Pre-Test And Post-Test Measurement Points

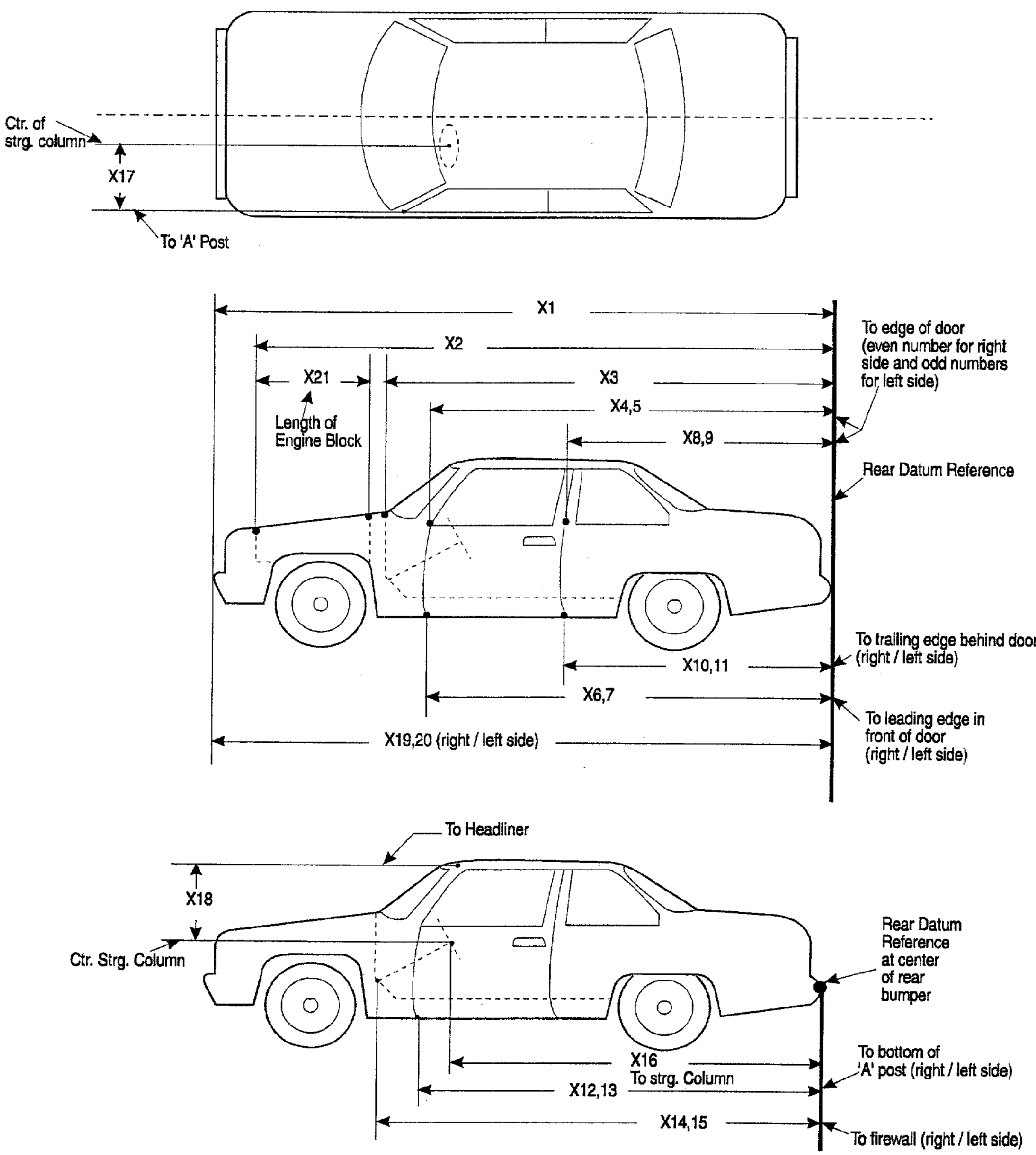


Table 13 Impacted Vehicle Measurements

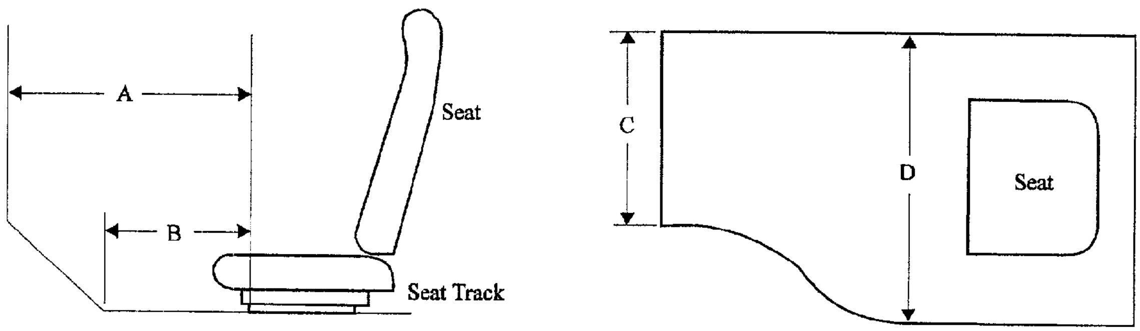
Test number: 980221

Vehicle year/make/model/body style: 1998/Oldsmobile/Intrigue/4-door sedan

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	5012 mm	4400 mm	612 mm
X2	Rear surface of vehicle to front of engine block	4377 mm	4135 mm	242 mm
X3	Rear surface of vehicle to firewall	3811 mm	3795 mm	16 mm
X4	Rear surface of vehicle to upper leading edge of right door	3364 mm	3362 mm	2 mm
X5	Rear surface of vehicle to upper leading edge of left door	3362 mm	3362 mm	0 mm
X6	Rear surface of vehicle to lower leading edge of right door	3370 mm	3362 mm	8 mm
X7	Rear surface of vehicle to lower leading edge of left door	3365 mm	3364 mm	1 mm
X8	Rear surface of vehicle to upper trailing edge of right door	2364 mm	2364 mm	0 mm
X9	Rear surface of vehicle to upper trailing edge of left door	2357 mm	2354 mm	3 mm
X10	Rear surface of vehicle to lower trailing edge of right door	2374 mm	2377 mm	-3 mm
X11	Rear surface of vehicle to lower trailing edge of left door	2367 mm	2364 mm	3 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	3354 mm	3354 mm	0 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	3351 mm	3344 mm	7 mm
X14	Rear surface of vehicle to firewall - right side	3860 mm	3650 mm	210 mm
X15	Rear surface of vehicle to firewall - left side	3887 mm	3796 mm	91 mm
X16	Rear surface of vehicle to steering wheel center	2927 mm	2942 mm	-15 mm
X17	Center of steering column to "A" post	295 mm	333 mm	-38 mm
X18	Center of steering column to headliner	420 mm	404 mm	16 mm
X19	Rear surface of vehicle to right side of front bumper	4812 mm	4434 mm	378 mm
X20	Rear surface of vehicle to left side of front bumper	4800 mm	4300 mm	500 mm
X21	Length of engine block	440 mm	440 mm	0 mm

Figure 12 Vehicle Intrusion Measurements

Static Footwell Deformation



Driver's Side

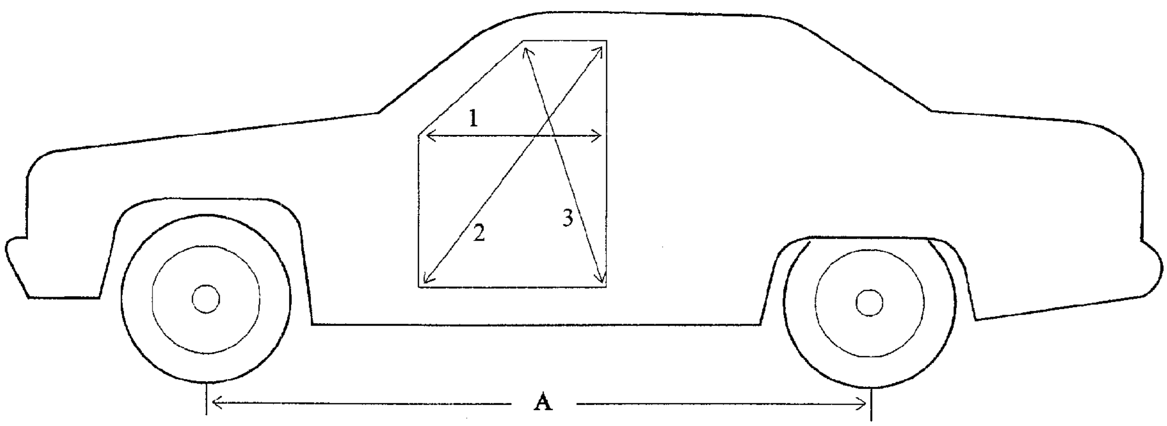
Measurement	Pre-Test	Post-Test	Difference
A	590 mm	575 mm	15 mm
B	491 mm	482 mm	9 mm
C	465 mm	444 mm	21 mm
D	465 mm	421 mm	44 mm

Passenger's Side

Measurement	Pre-Test	Post-Test	Difference
A	545 mm	524 mm	21 mm
B	470 mm	460 mm	10 mm
C	405 mm	388 mm	17 mm
D	439 mm	441 mm	-2 mm

Figure 13 Vehicle Intrusion Measurements

Door Opening Width

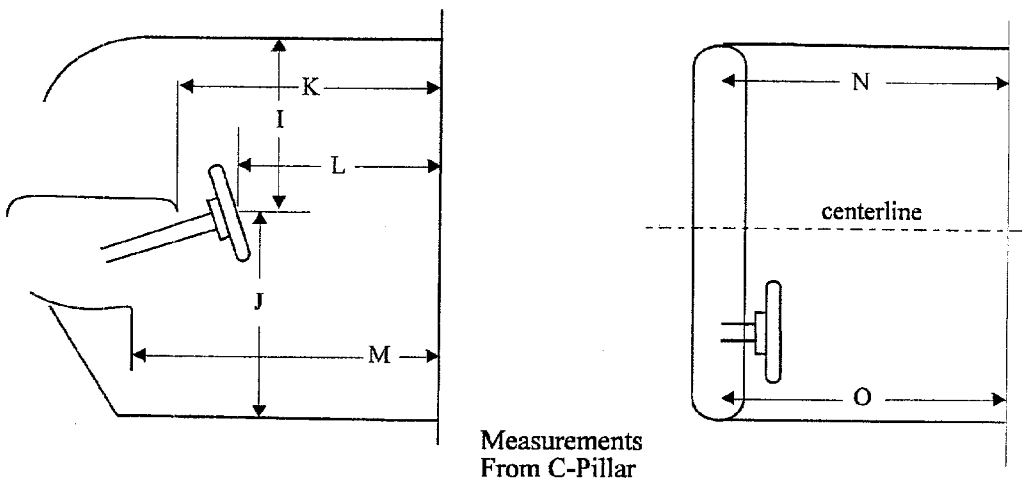


Units (mm)	Left			Right		
Measurement	1	2	3	1	2	3
Pre-Test	970 mm	1452 mm	986 mm	968 mm	1465 mm	996 mm
Post-Test	968 mm	1415 mm	993 mm	959 mm	1466 mm	1000 mm
Difference	2 mm	37 mm	-7 mm	9 mm	-1 mm	-4 mm

Units (mm)	A = Wheelbase Left	A = Wheelbase Right
Pre-Test	2769 mm	2769 mm
Post-Test	2691 mm	2655 mm
Difference	78 mm	114 mm

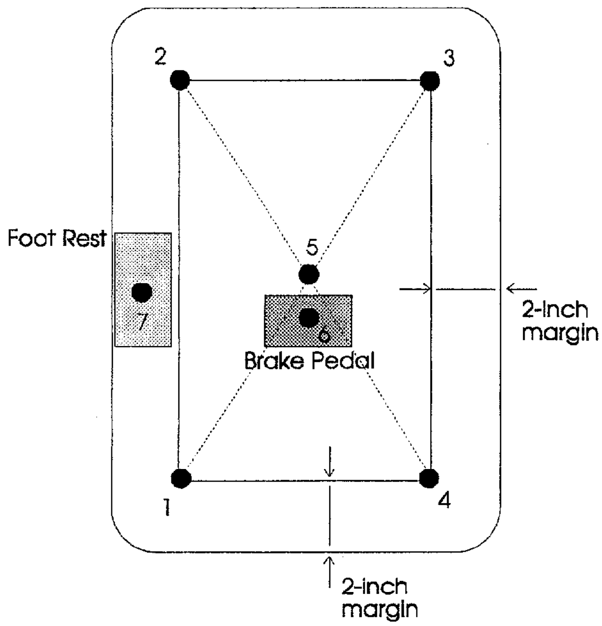
Figure 14 Vehicle Intrusion Measurements

Static Passenger Compartment Intrusion



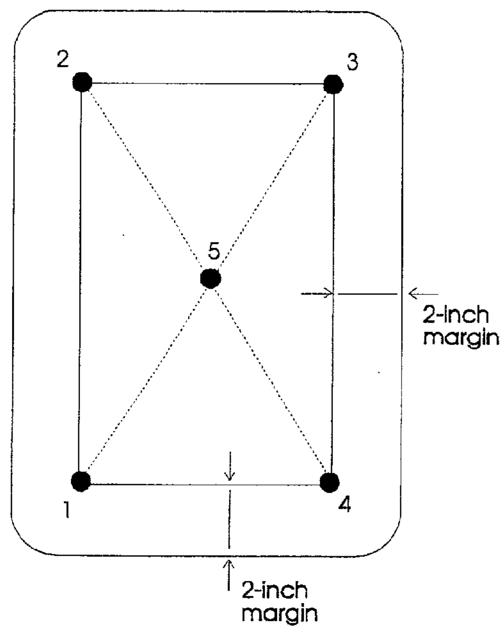
Measurement	Pre-Test	Post-Test	Difference
I	450 mm	383 mm	67 mm
J	580 mm	591 mm	-11 mm
K (driver's side)	1875 mm	1887 mm	-12 mm
L	1650 mm	1705 mm	-55 mm
M (driver's side)	1740 mm	1710 mm	30 mm
N	1870 mm	1870 mm	0 mm
O	1870 mm	1857 mm	13 mm
K (passenger's side)	1880 mm	1895 mm	-15 mm
M (passenger's side)	1750 mm	1730 mm	20 mm

Figure 15 Driver Toeboard Measurements



Driver Side		X	Z
1	Pre-Test	1060	233
	Post-Test	1035	288
	Crush	25	-55
2	Pre-Test	1490	256
	Post-Test	1467	322
	Crush	23	-66
3	Pre-Test	1474	259
	Post-Test	1456	356
	Crush	18	-97
4	Pre-Test	1040	233
	Post-Test	1060	259
	Crush	-20	-26
5	Pre-Test	1290	233
	Post-Test	1285	278
	Crush	5	-45
6	Pre-Test	1493	452
	Post-Test	1426	521
	Crush	67	-69
7	Pre-Test	1528	356
	Post-Test	1516	422
	Crush	12	-66

Figure 16 Passenger Toeboard Measurements



Passenger Side		X	Z
1	Pre-Test	1040	224
	Post-Test	1065	251
	Crush	-25	-27
2	Pre-Test	1465	232
	Post-Test	1400	382
	Crush	65	-150
3	Pre-Test	1515	251
	Post-Test	1510	323
	Crush	5	-72
4	Pre-Test	1100	224
	Post-Test	1095	270
	Crush	5	-46
5	Pre-Test	1300	224
	Post-Test	1295	287
	Crush	5	-63
6	Pre-Test	N/A	N/A
	Post-Test	N/A	N/A
	Crush	N/A	N/A
7	Pre-Test	N/A	N/A
	Post-Test	N/A	N/A
	Crush	N/A	N/A

Appendix A

Photographs

Figure A-1 Pre-Test Front View

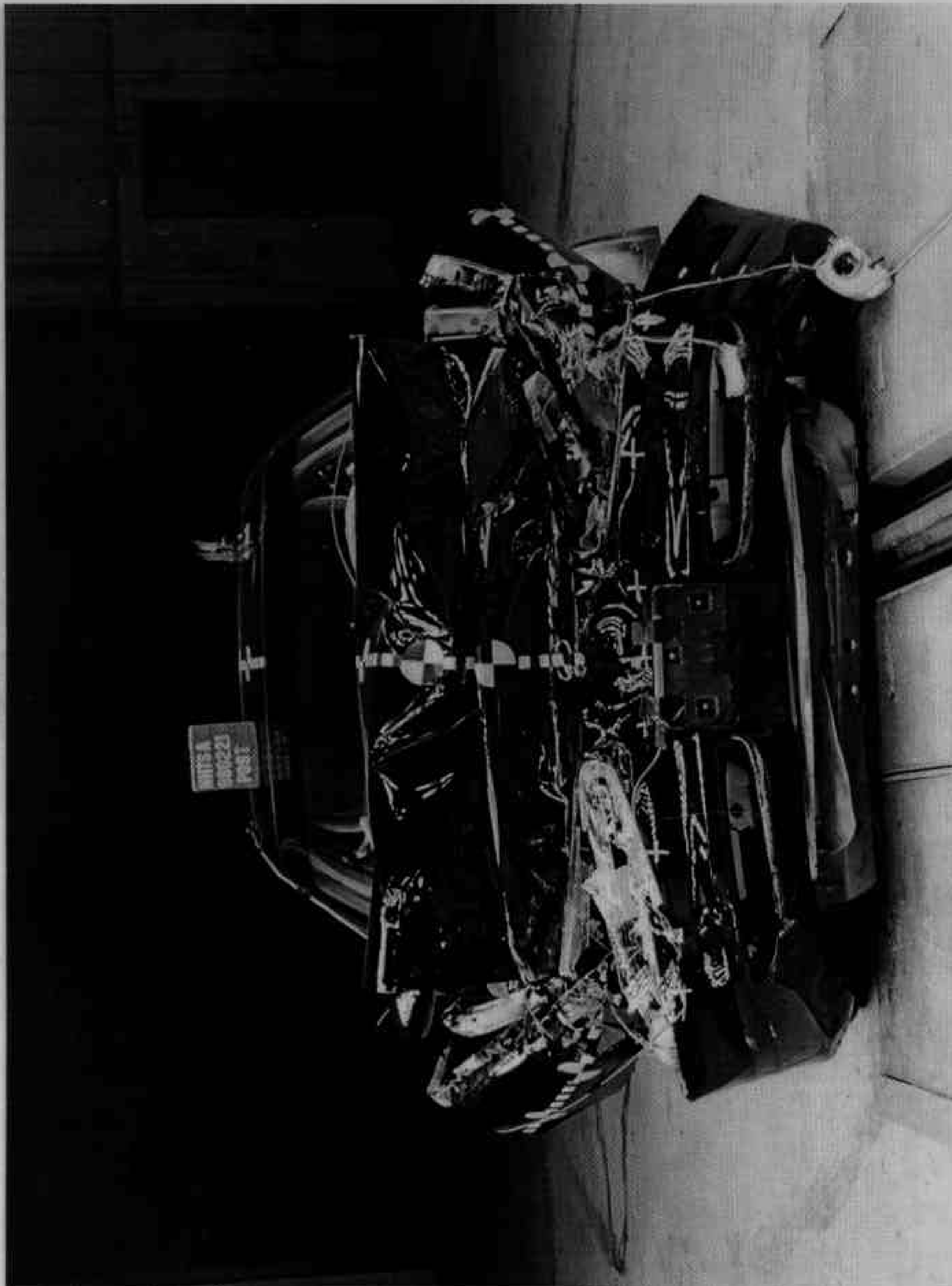


Figure A-2 Post-Test Front View

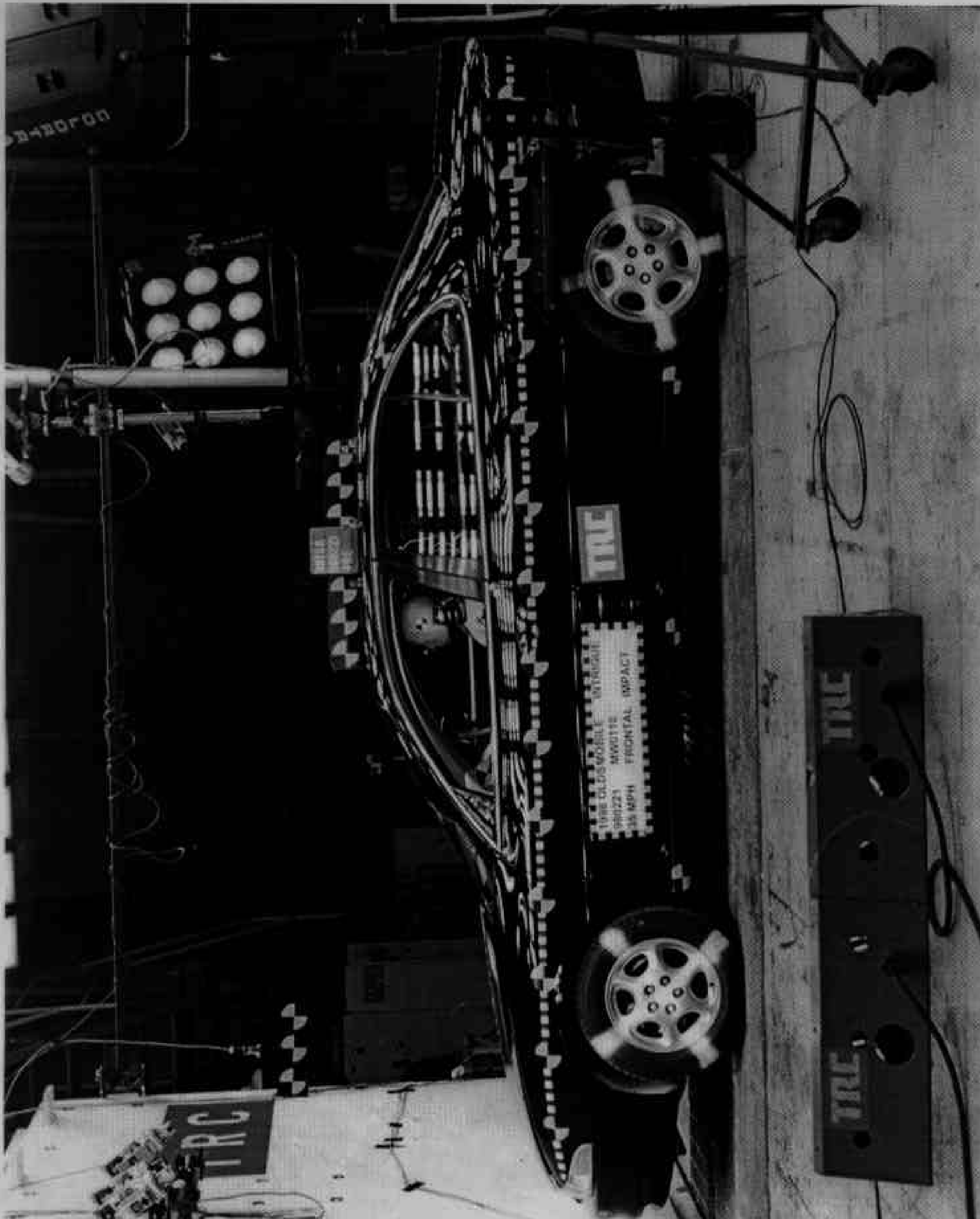


Figure A-3 Pre-Test Left Side View

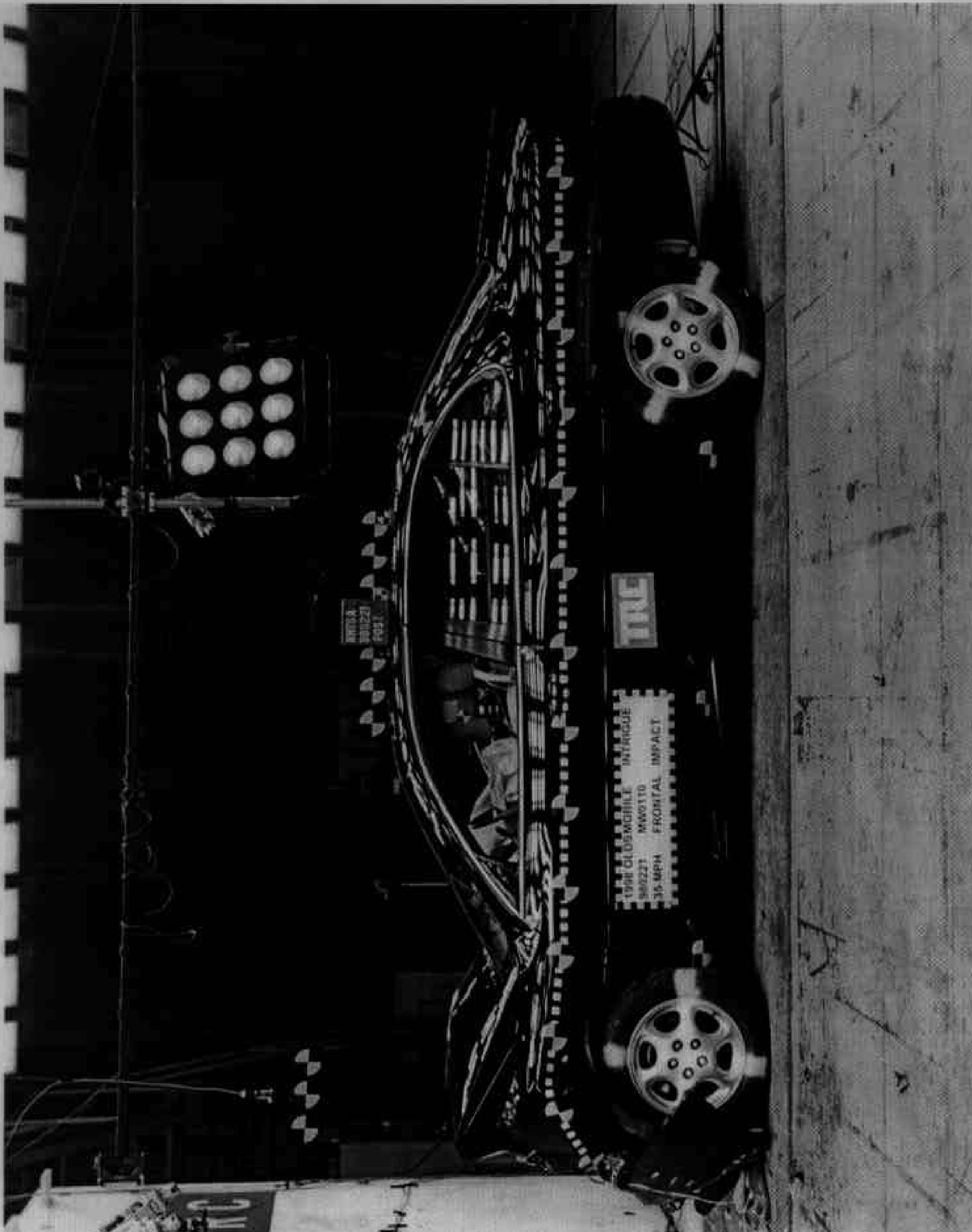


Figure A-4 Post-Test Left Side View

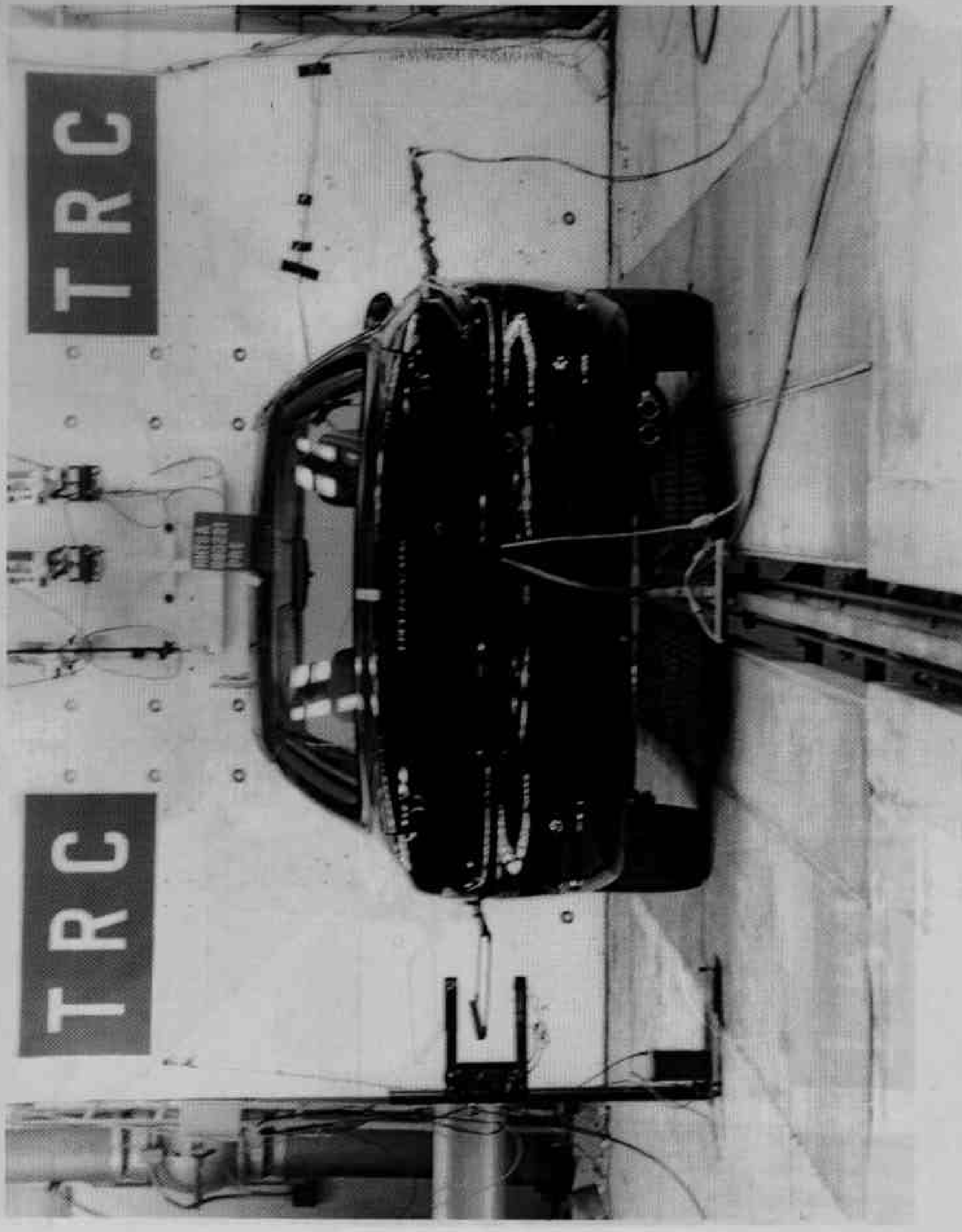


Figure A-5 Pre-Test Rear View

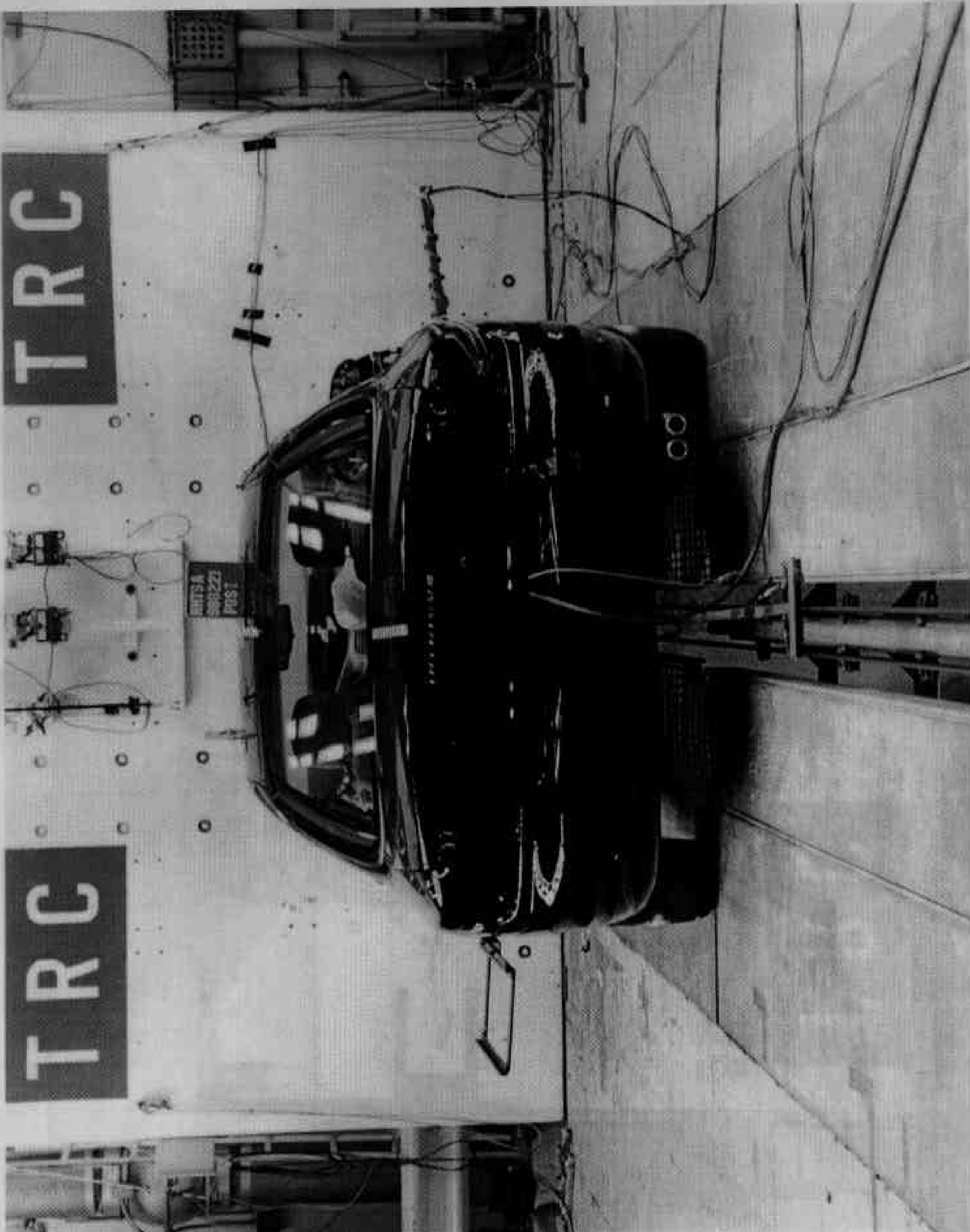


Figure A-6 Post-Test Rear View

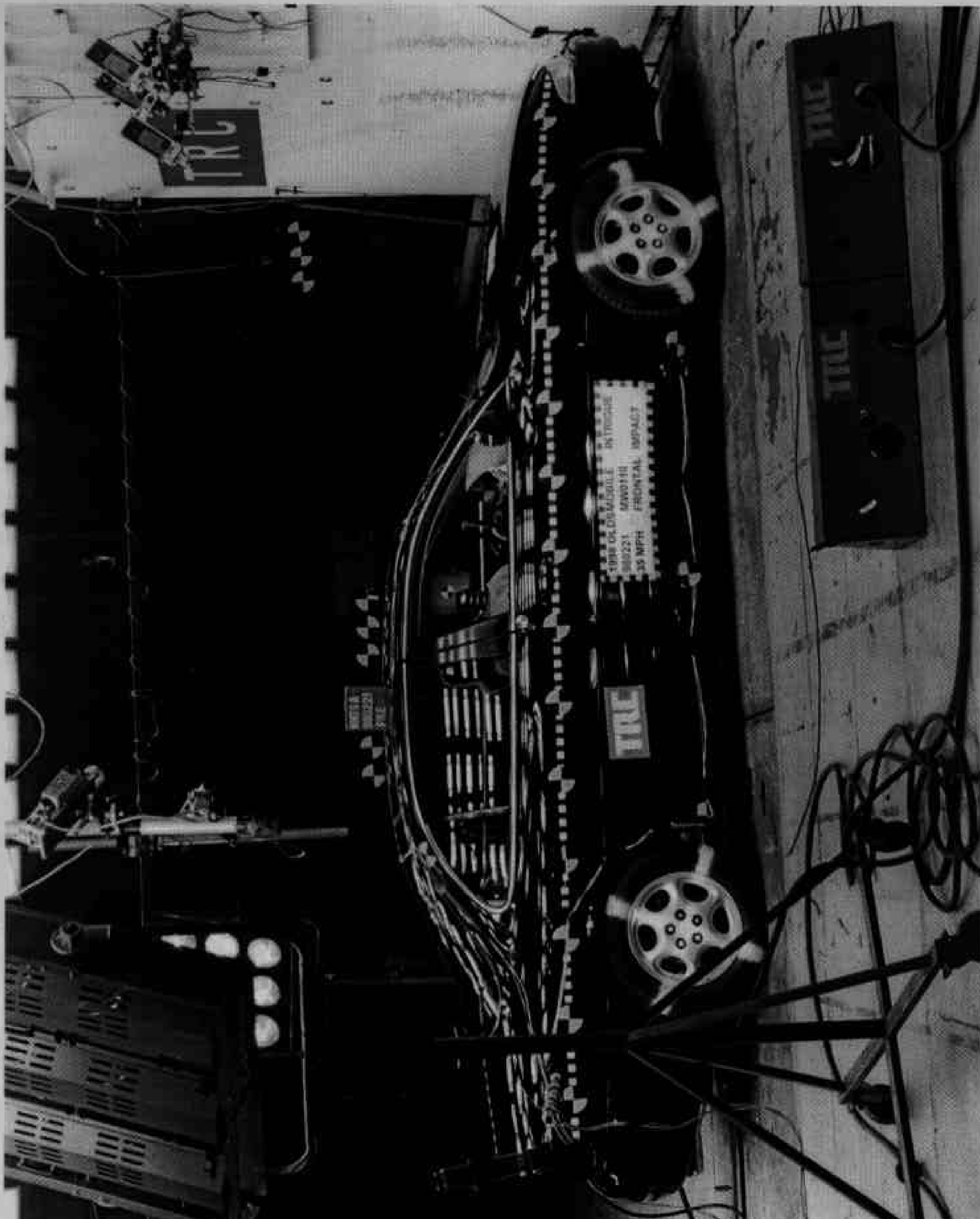


Figure A-7 Pre-Test Right Side View

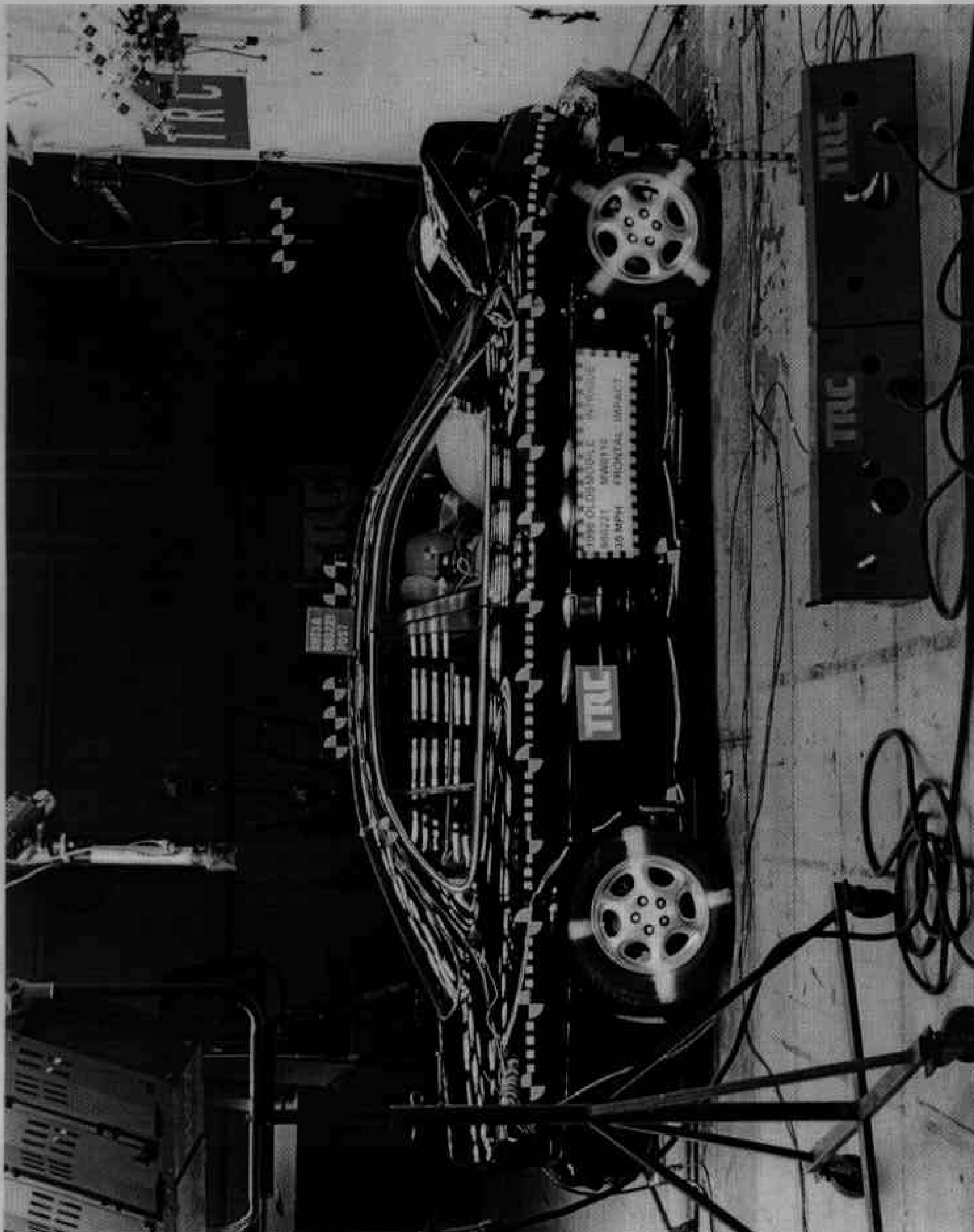


Figure A-8 Post-Test Right Side View

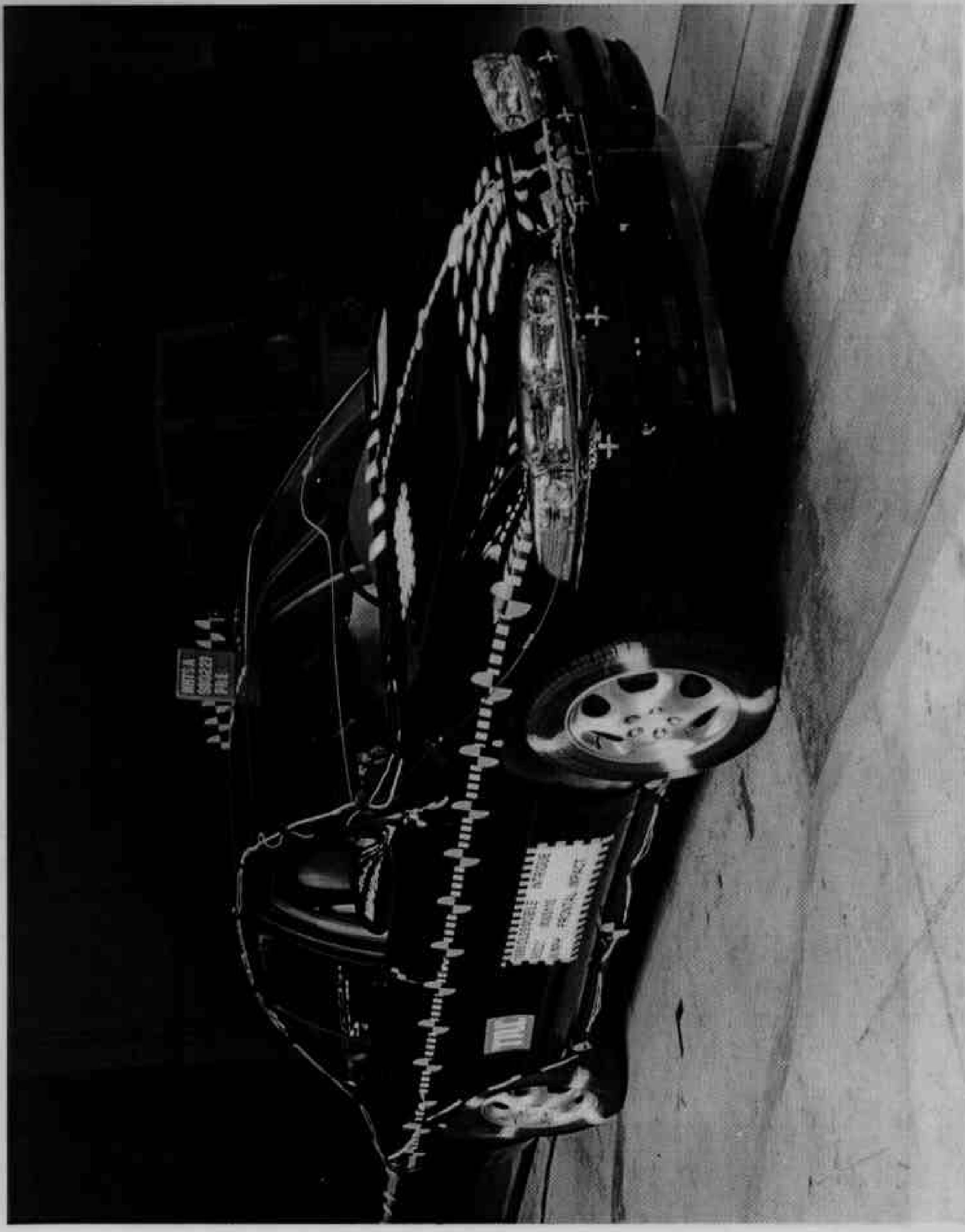


Figure A-9. Pre-Test Right Front Three-Quarter View

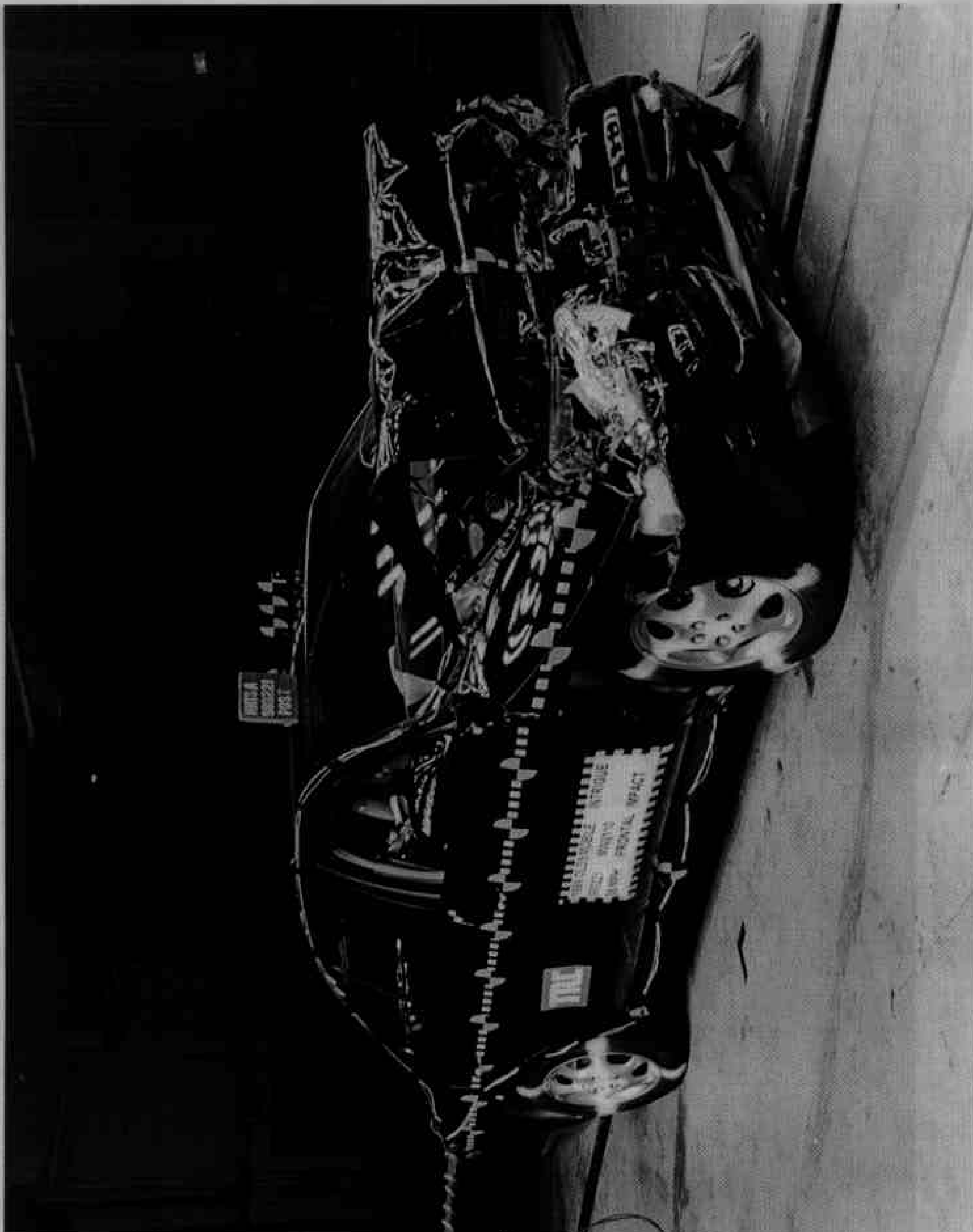


Figure A-10 Post-Test Right Front Three-Quarter View

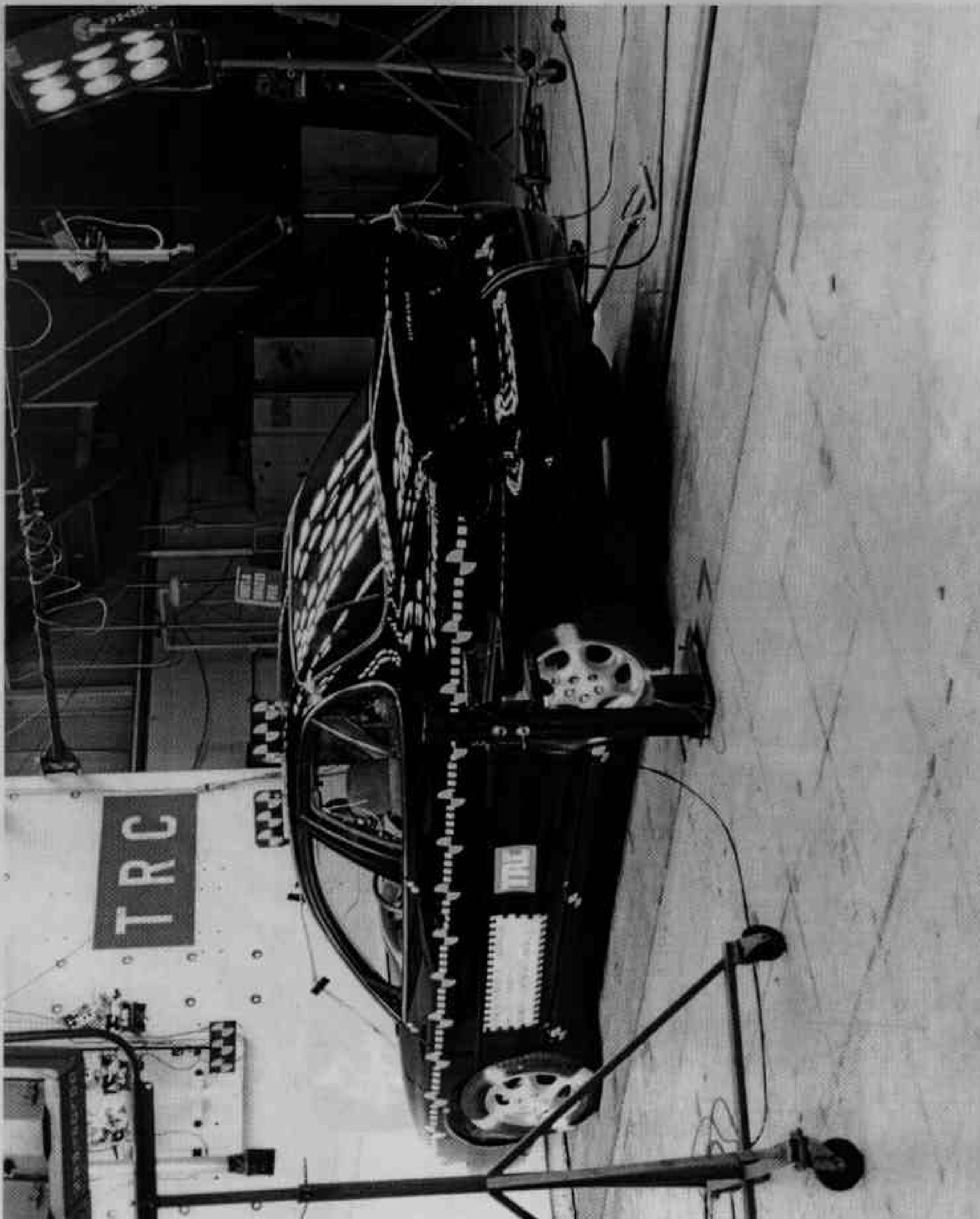


Figure A-11 Pre-Test Left Rear Three-Quarter View

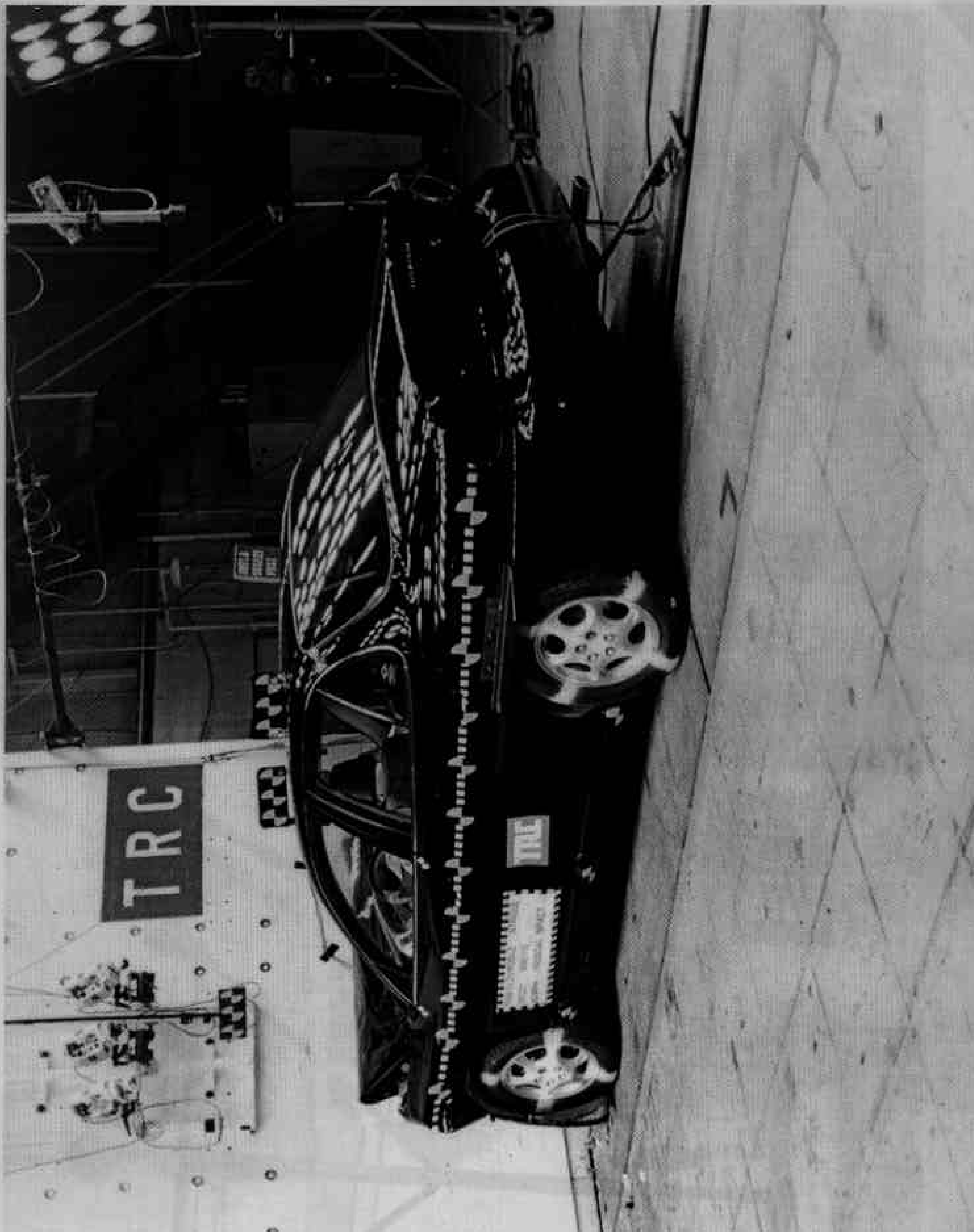


Figure A-12 Post-Test Left Rear Three-Quarter View

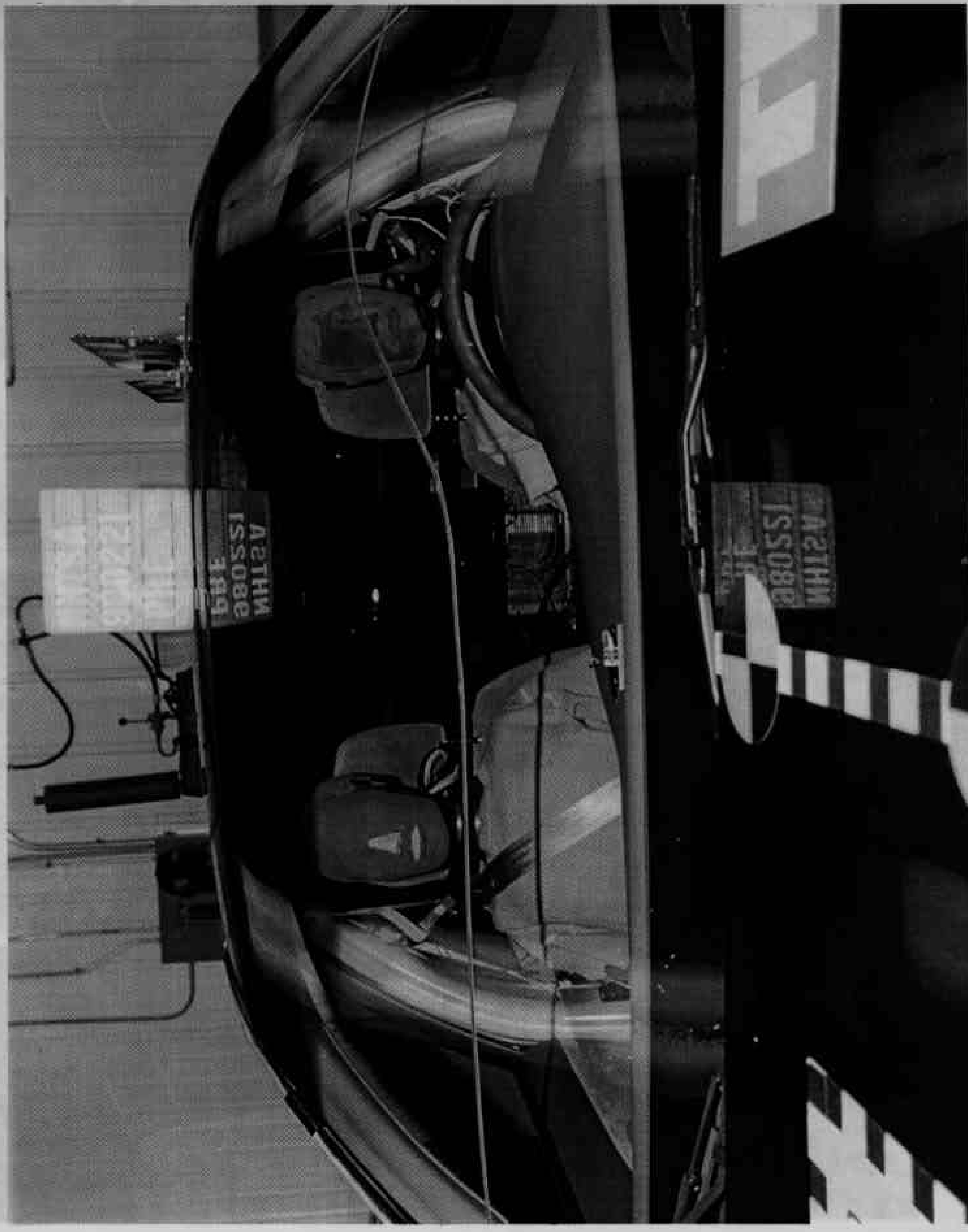


Figure A-13 Pre-Test Windshield View

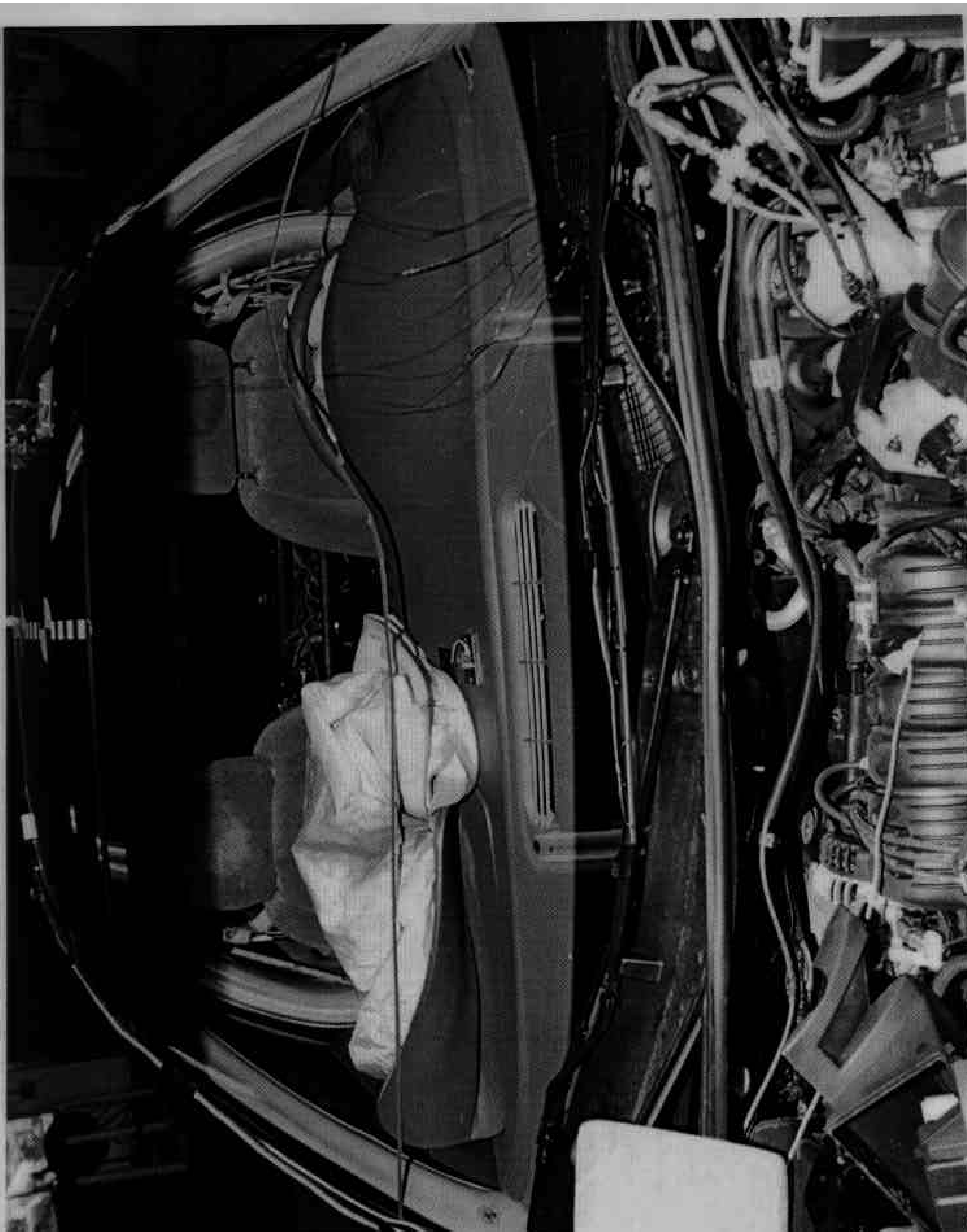


Figure A-14 Post-Test Windshield View

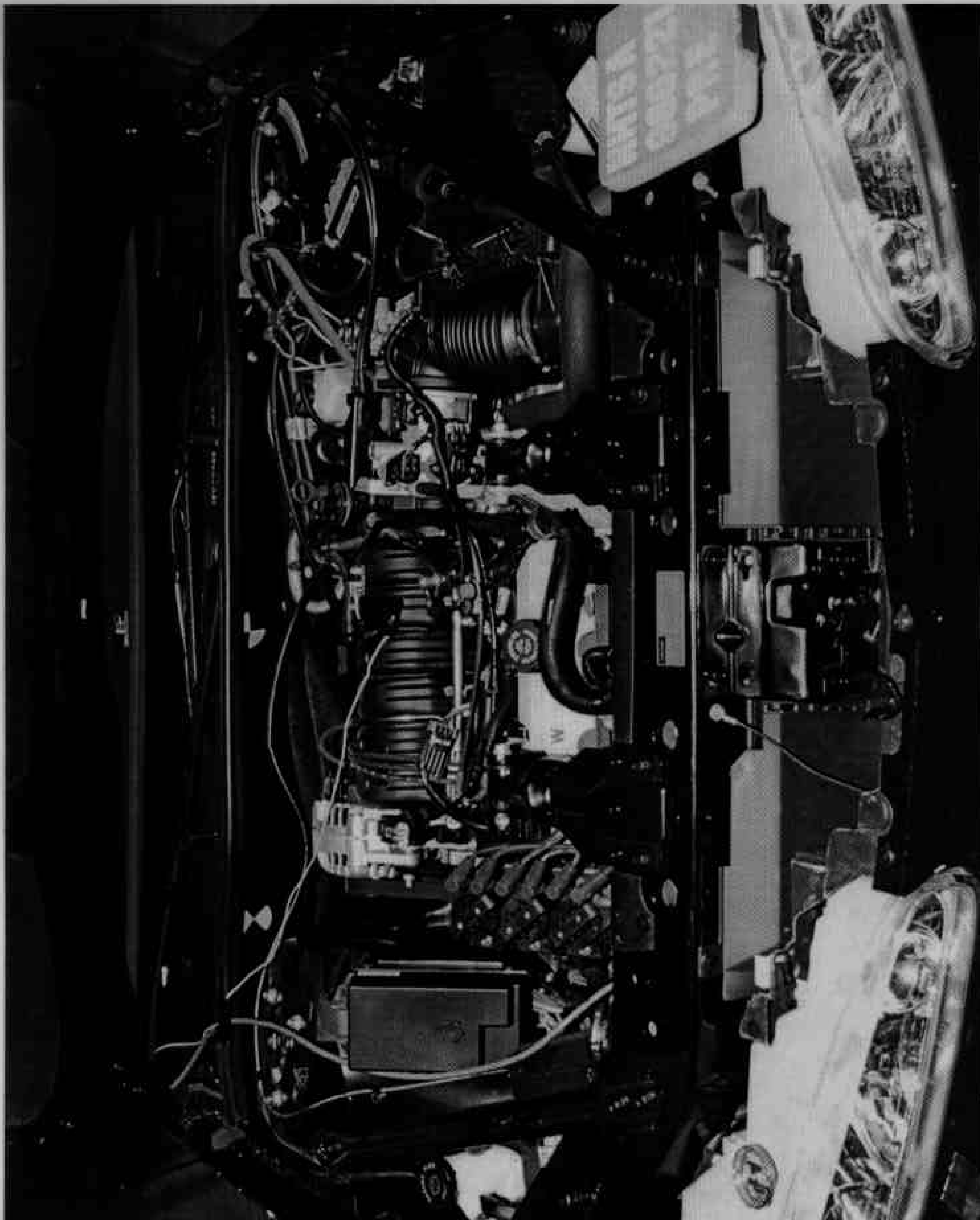


Figure A-15 Pre-Test Engine Compartment View

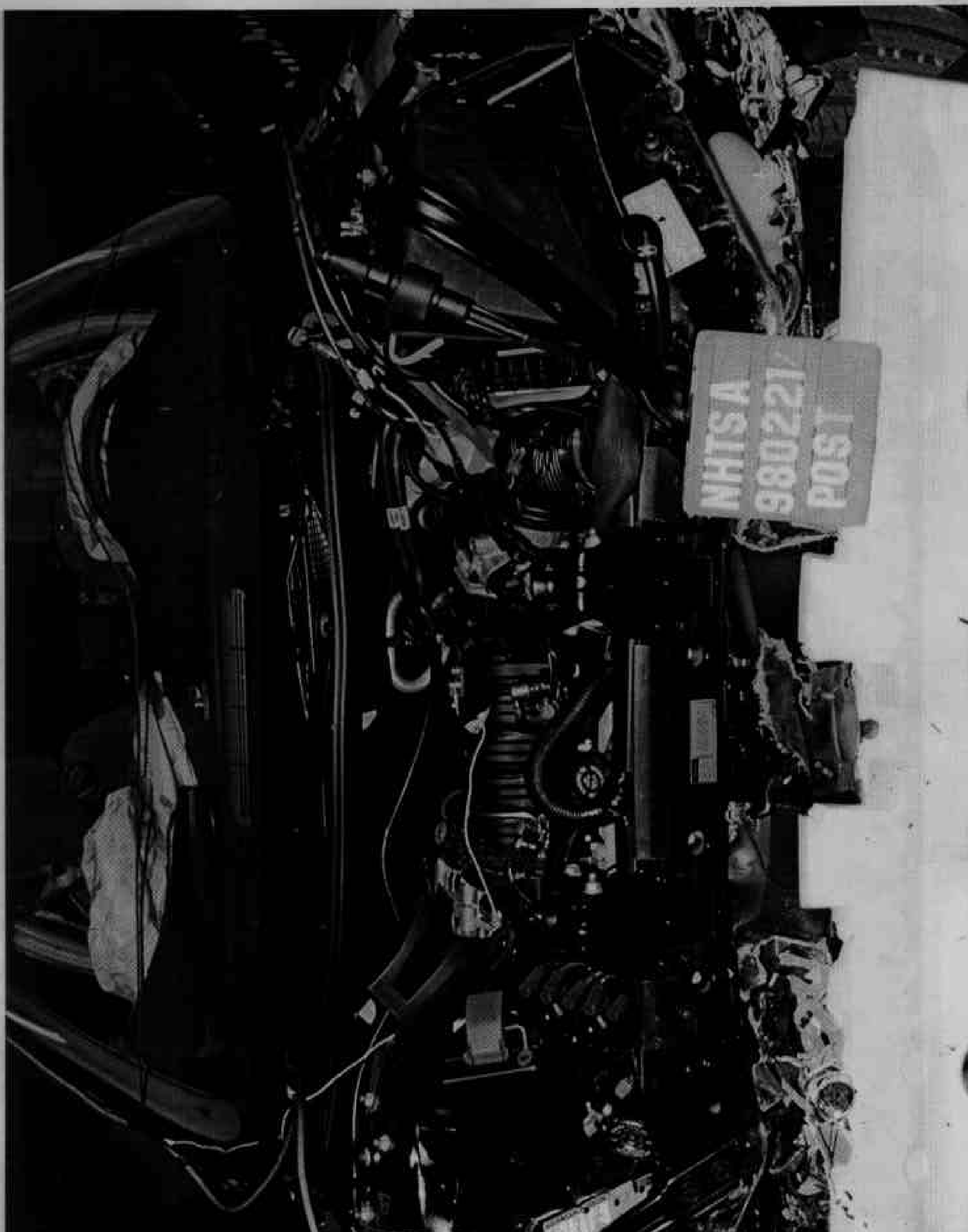


Figure A-16 Post-Test Engine Compartment View

Figure A-17 Pre-Test Fuel Filler Cap View

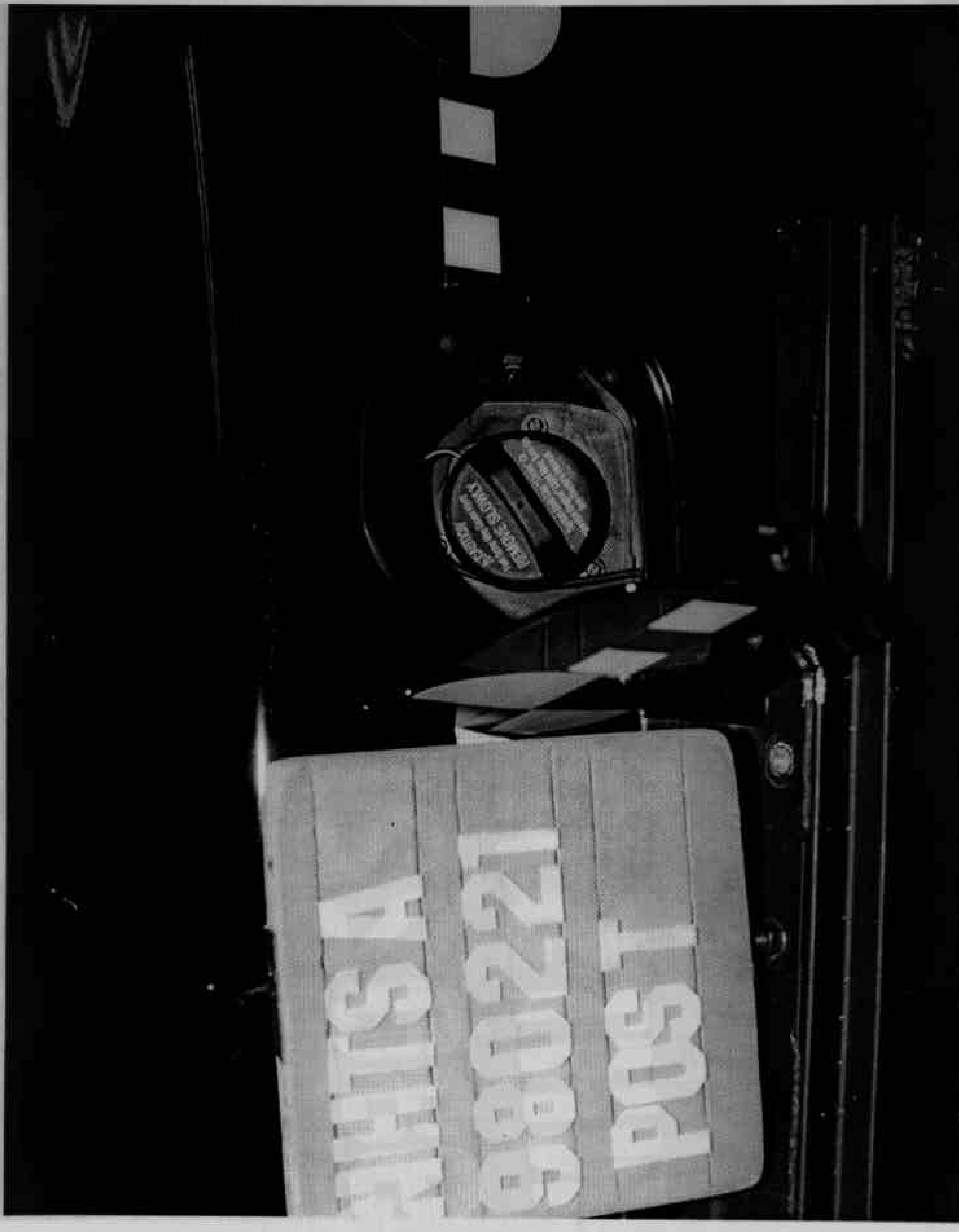


Figure A-18 Post-Test Fuel Filler Cap View

Figure A-19 Pre-Test Fuel Filler Neck View

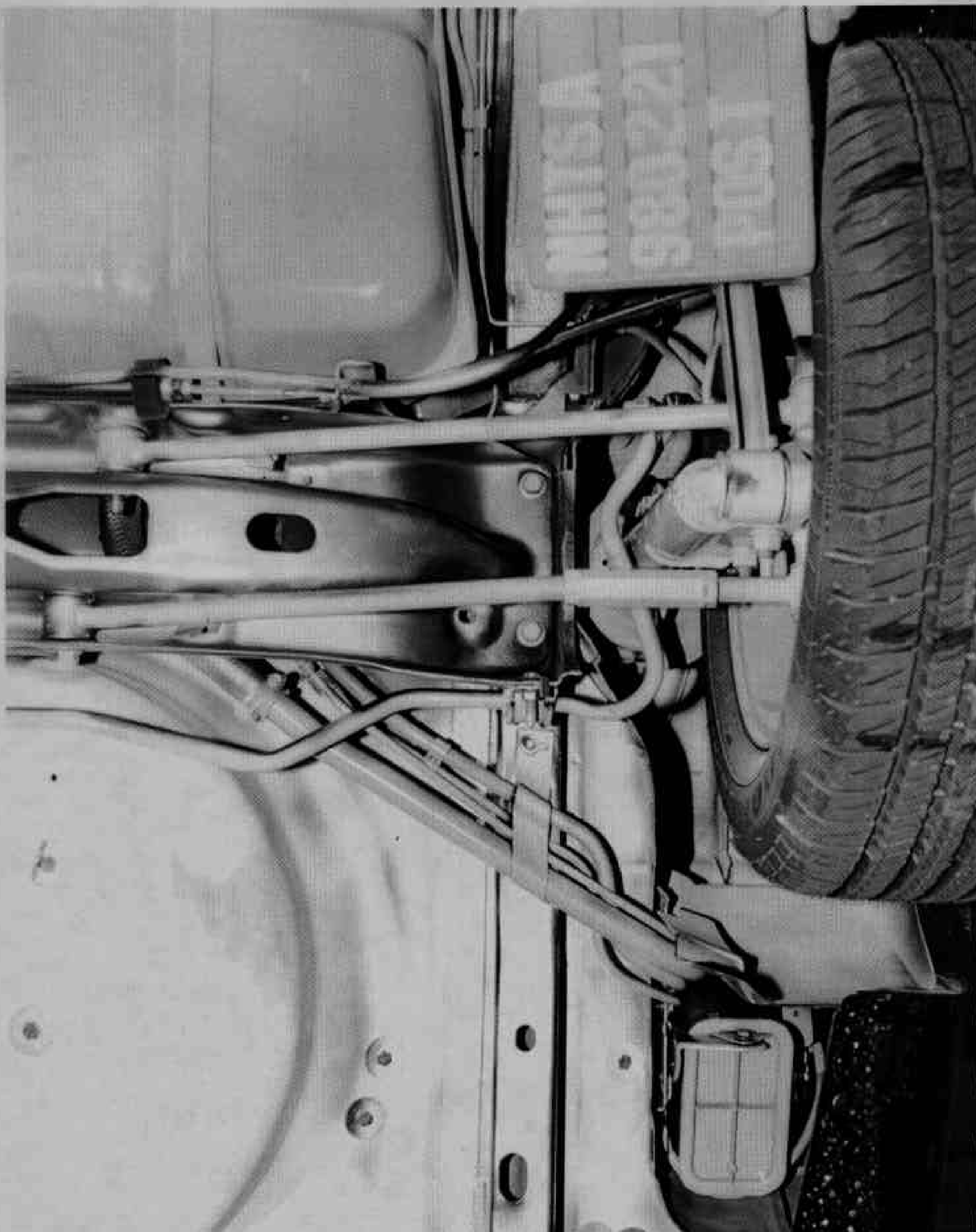


Figure A-20 Post-Test Fuel Filler Neck View

Figure A-21 Pre-Test Fuel Tank View

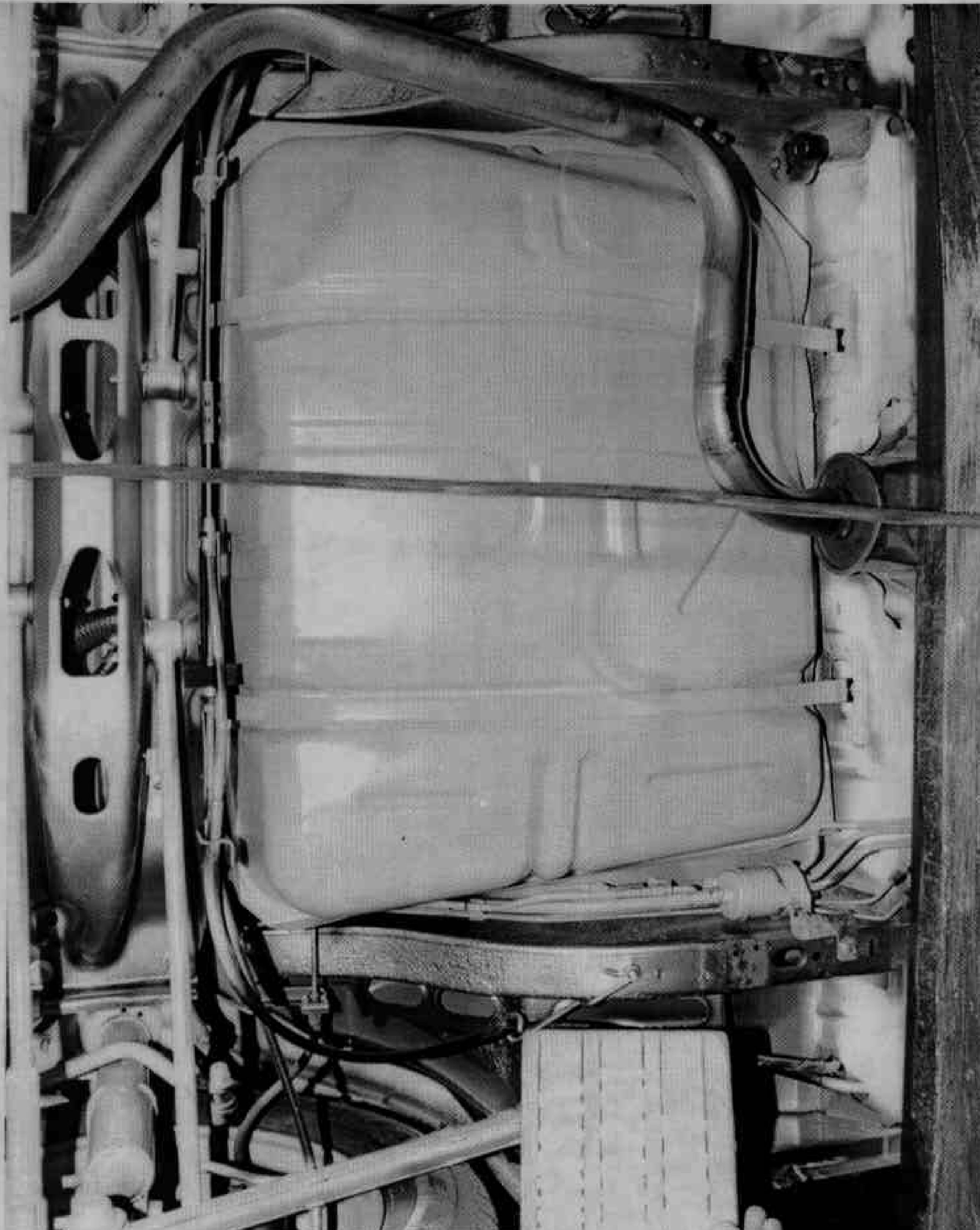


Figure A-22 Post-Test Fuel Tank View

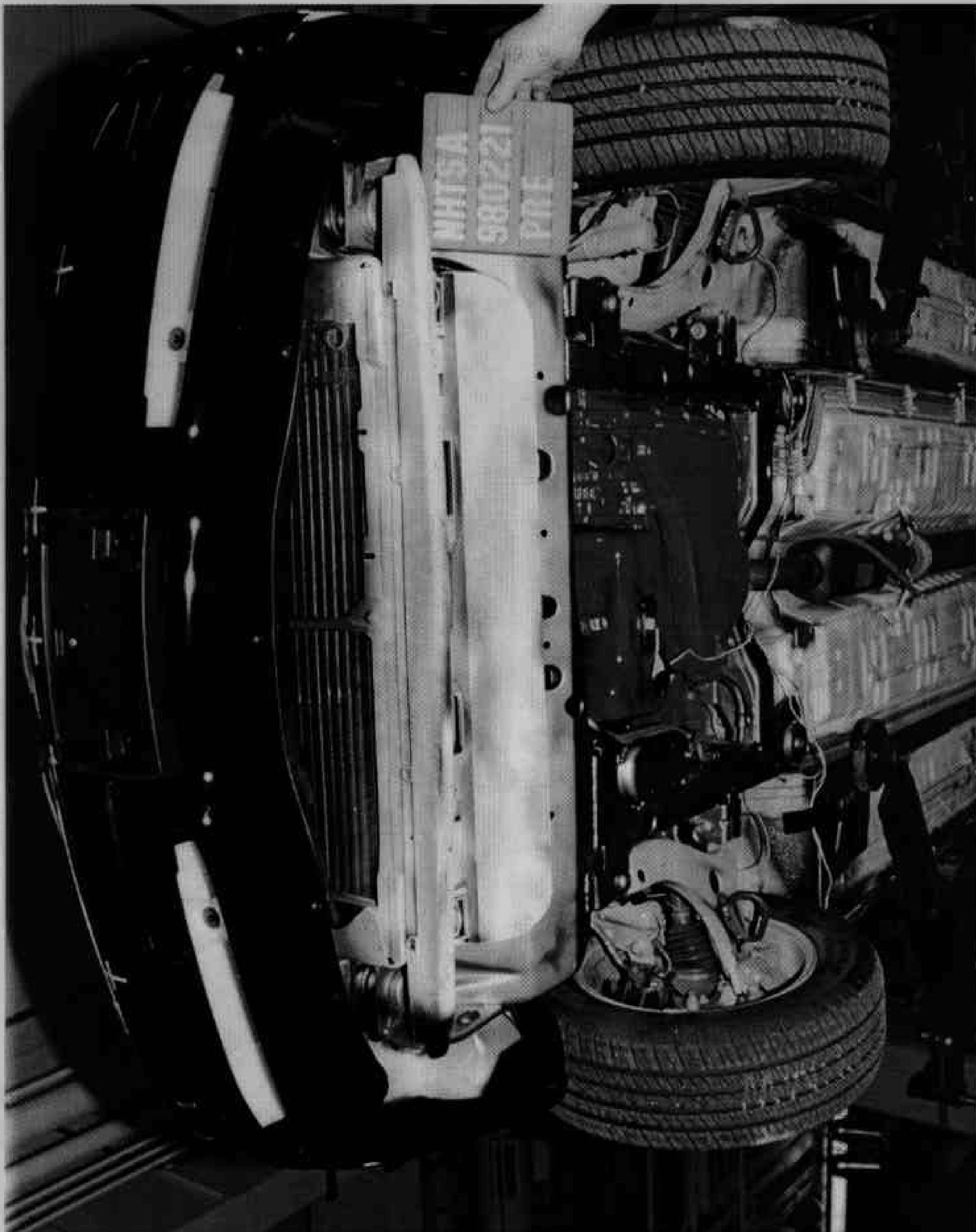


Figure A-23 Pre-Test Front Underbody View

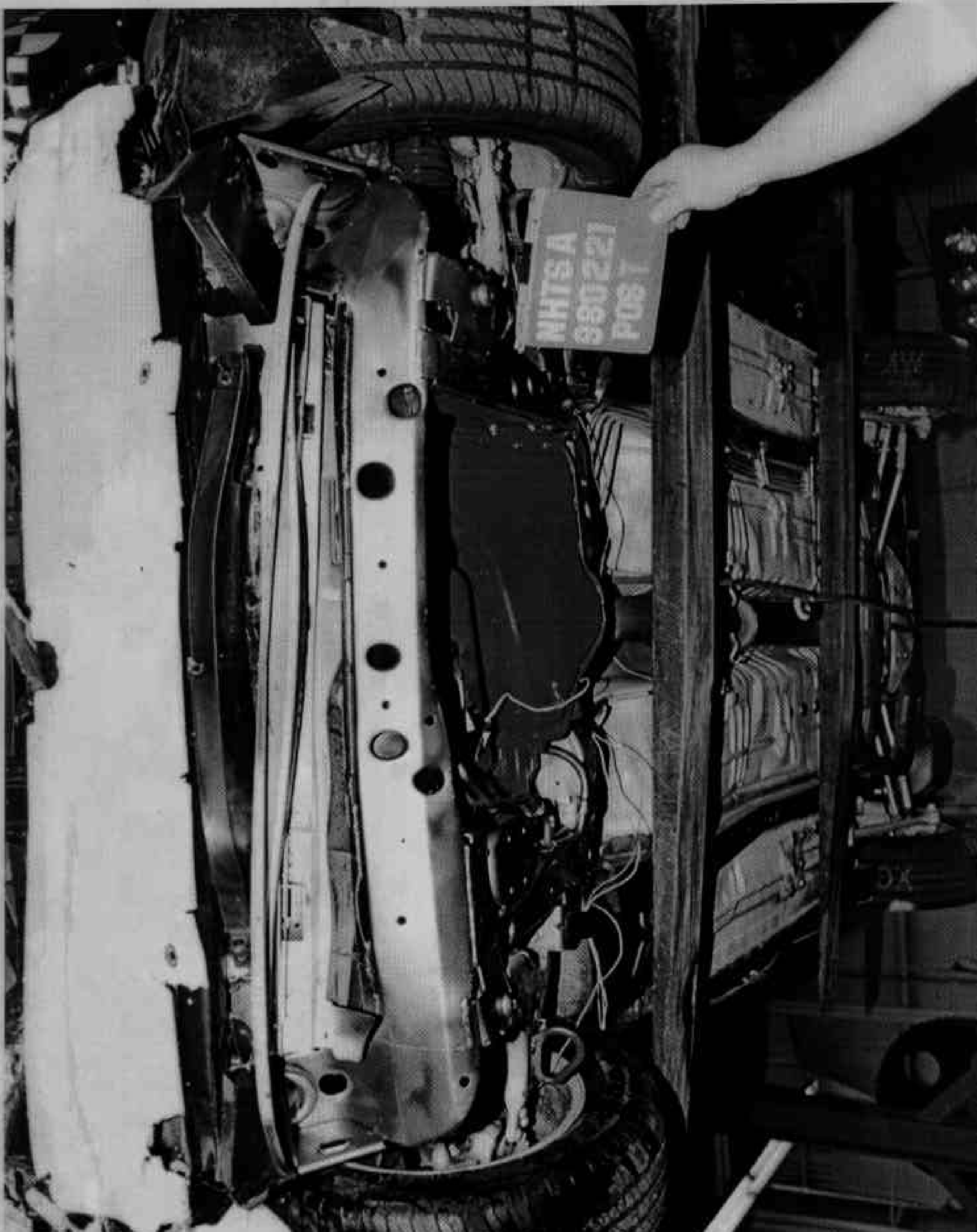


Figure A-24 Post-Test Front Underbody View

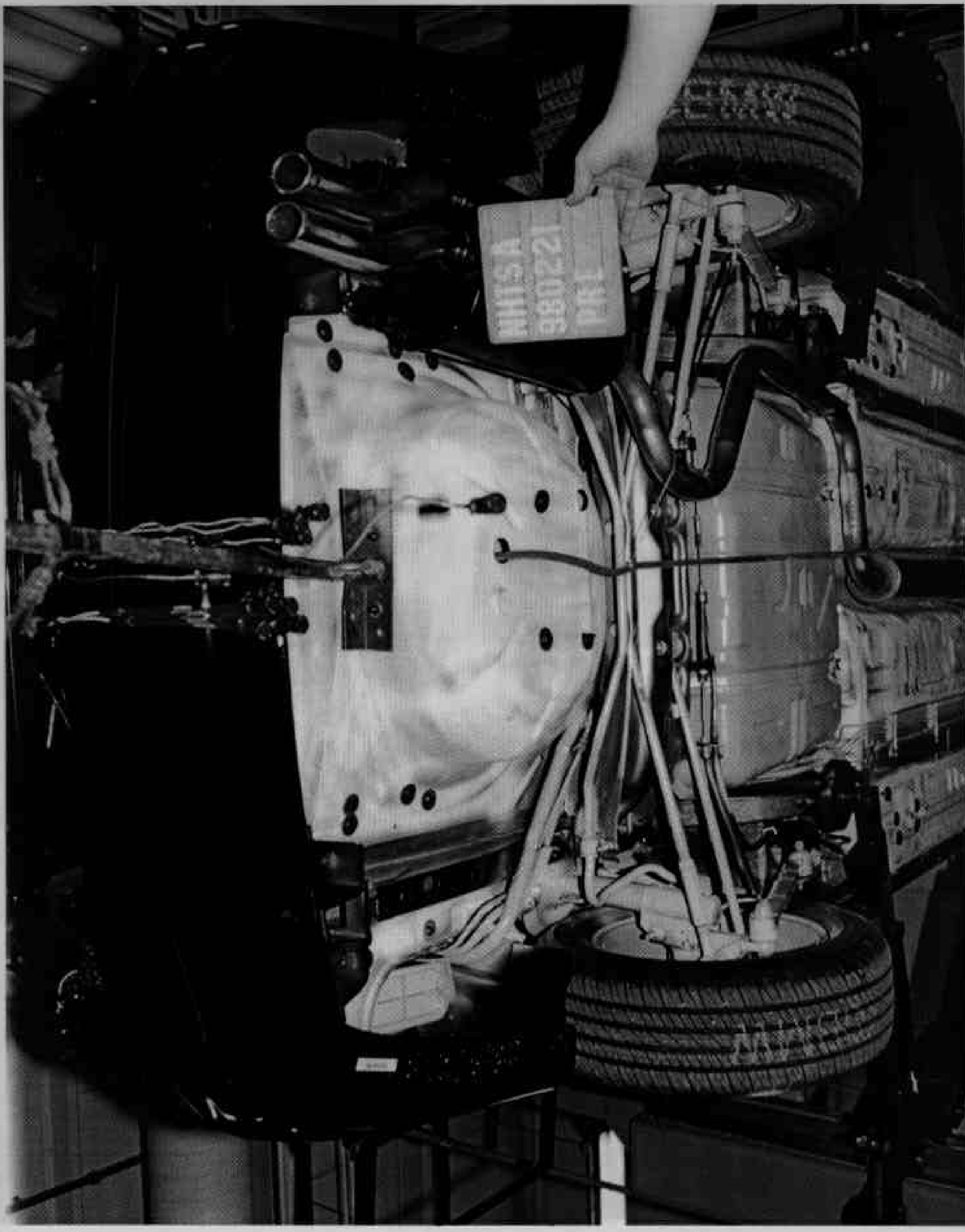


Figure A-25 Pre-Test Rear Underbody View

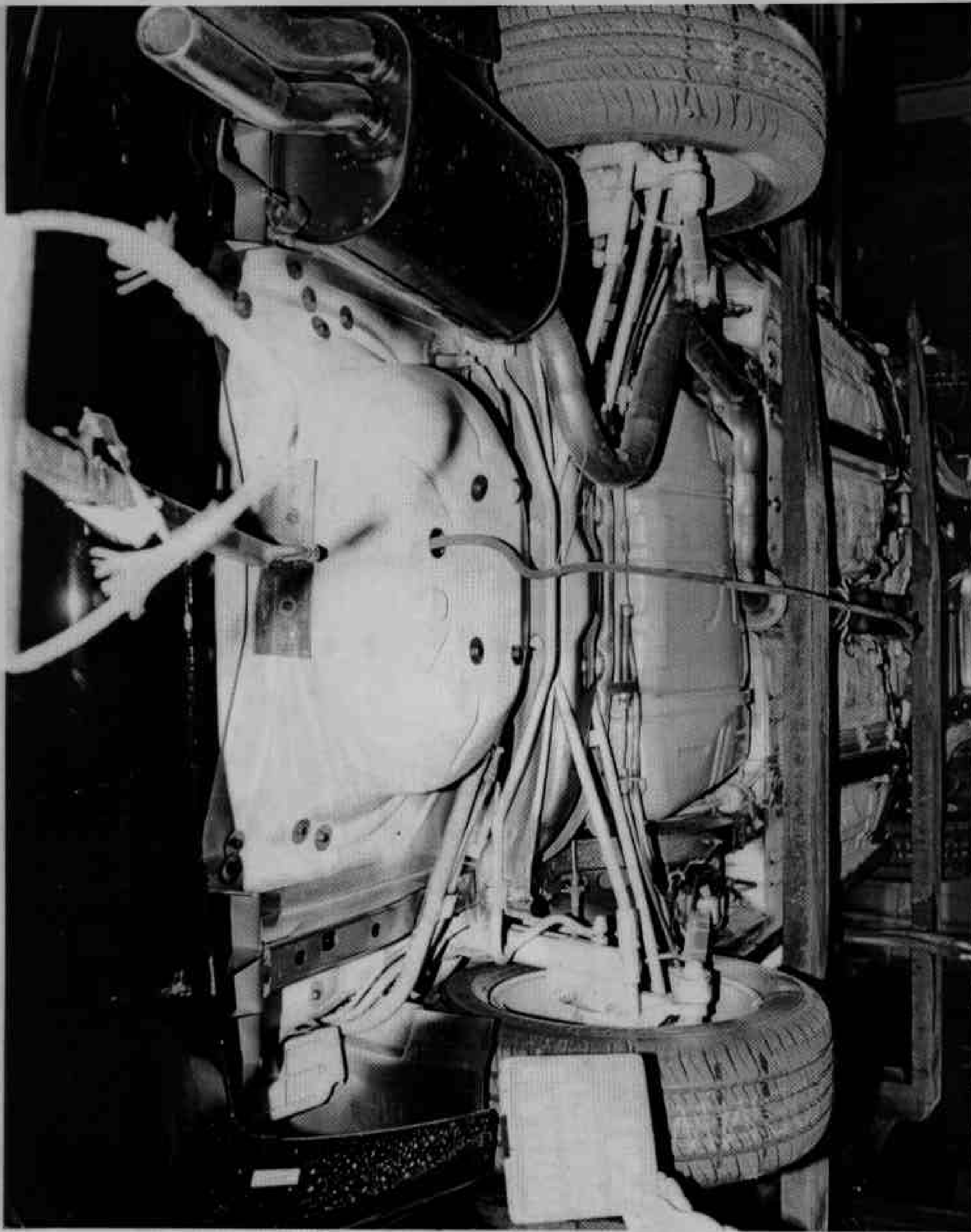


Figure A-26 Post-Test Rear Underbody View

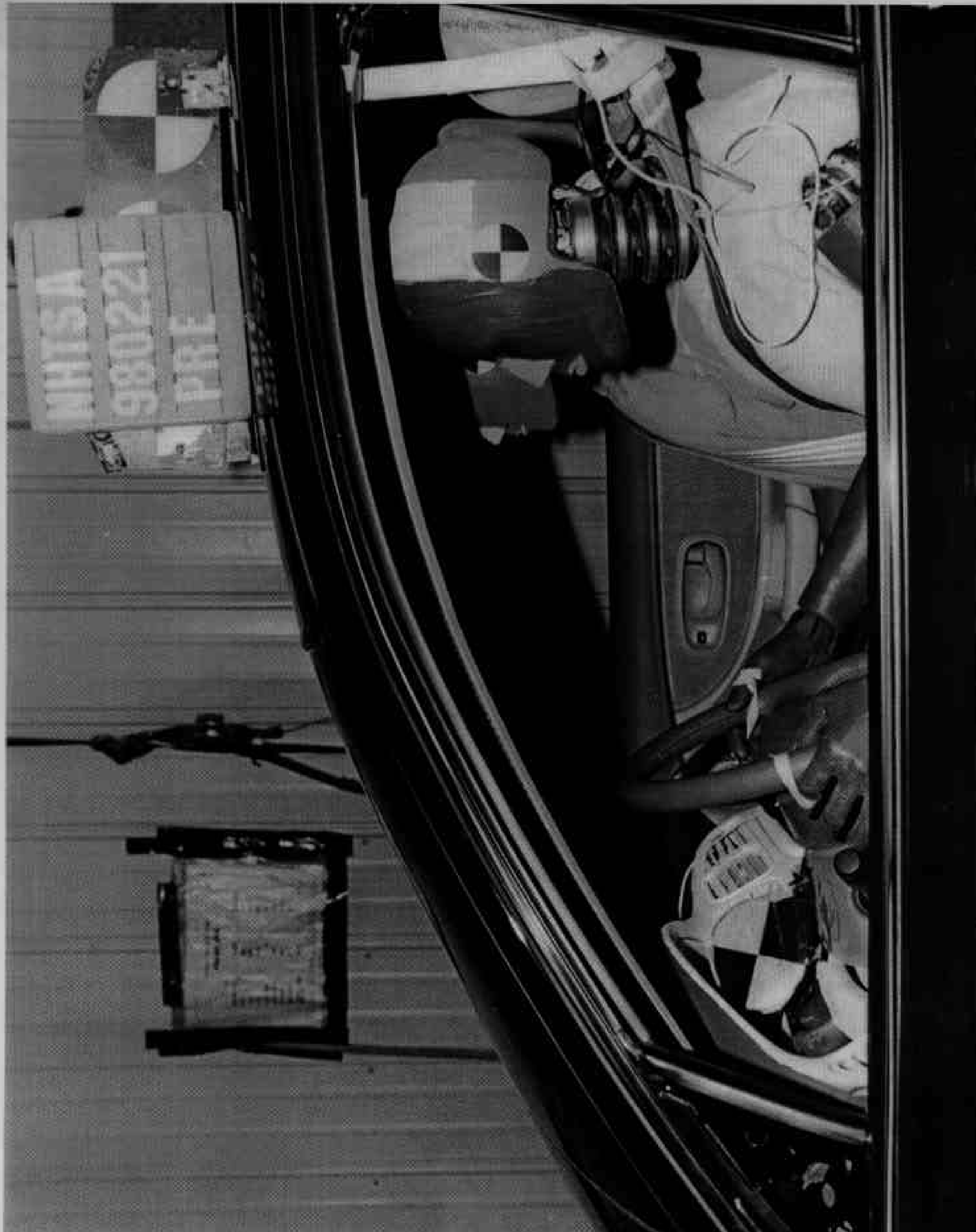


Figure A-27 Pre-Test Driver Dummy Position View

Figure A-28 Post-Test Driver Dummy Position View

Figure A-29 Pre-Test Passenger Dummy Position View

Figure A-30 Post-Test Passenger Dummy Position View

Figure A-31 Pre-Test Driver Dummy and Vehicle Interior - View 1

Figure A-32 Post-Test Driver Dummy and Vehicle Interior - View 1

Figure A-33 Pre-Test Driver Dummy and Vehicle Interior - View 2

Figure A-34 Post-Test Driver Dummy and Vehicle Interior - View 2

Figure A-35 Pre-Test Passenger Dummy and Vehicle Interior - View 1

Figure A-36 Post-Test Passenger Dummy and Vehicle Interior - View 1

Figure A-37 Pre-Test Passenger Dummy and Vehicle Interior - View 2

Figure A-38 Post-Test Passenger Dummy and Vehicle Interior - View 2

Figure A-39 Post-Test Driver Dummy View

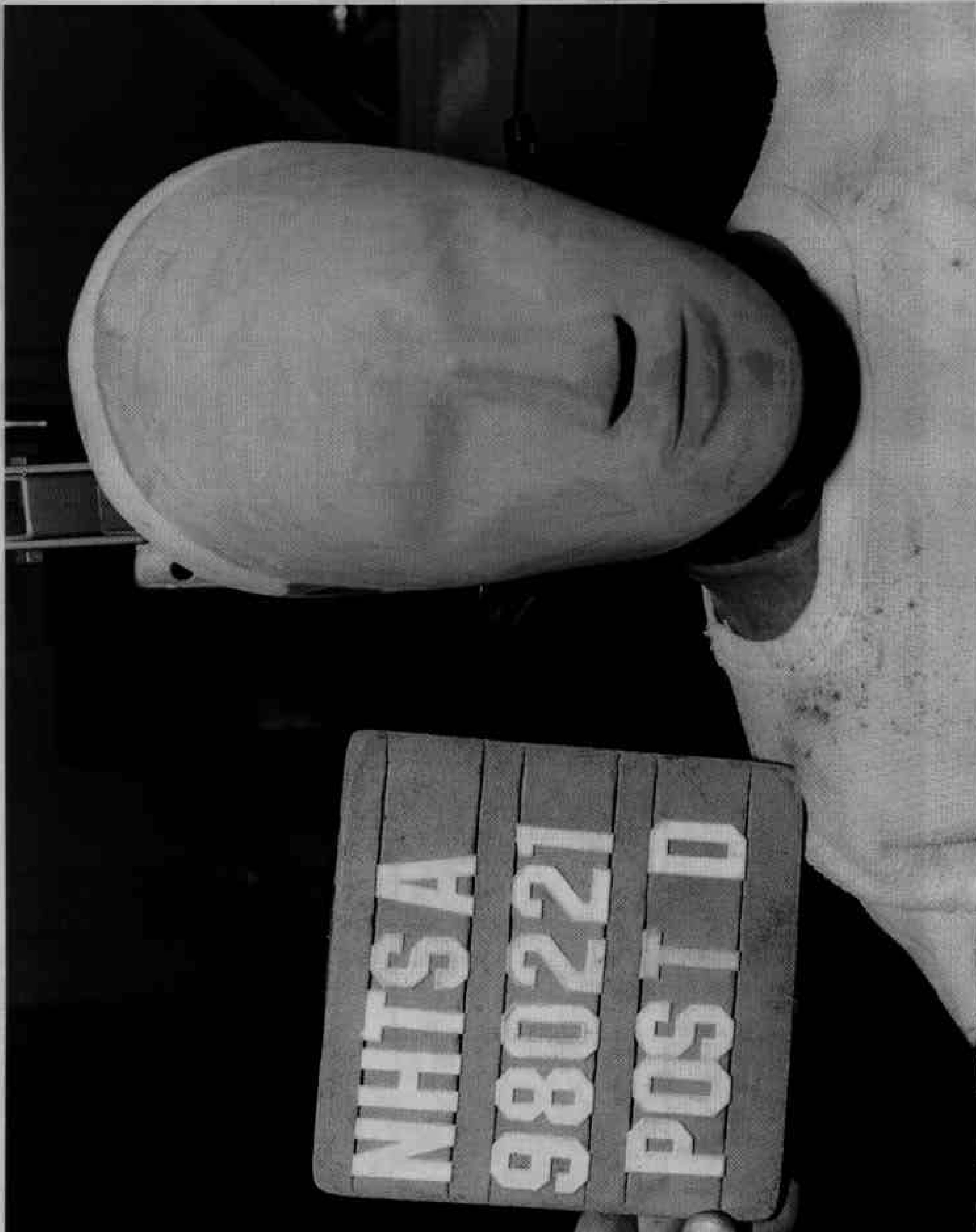


Figure A-40 Post-Test Driver Dummy Head Contact - View 1

Figure A-41 Post-Test Driver Dummy Head Contact - View 2

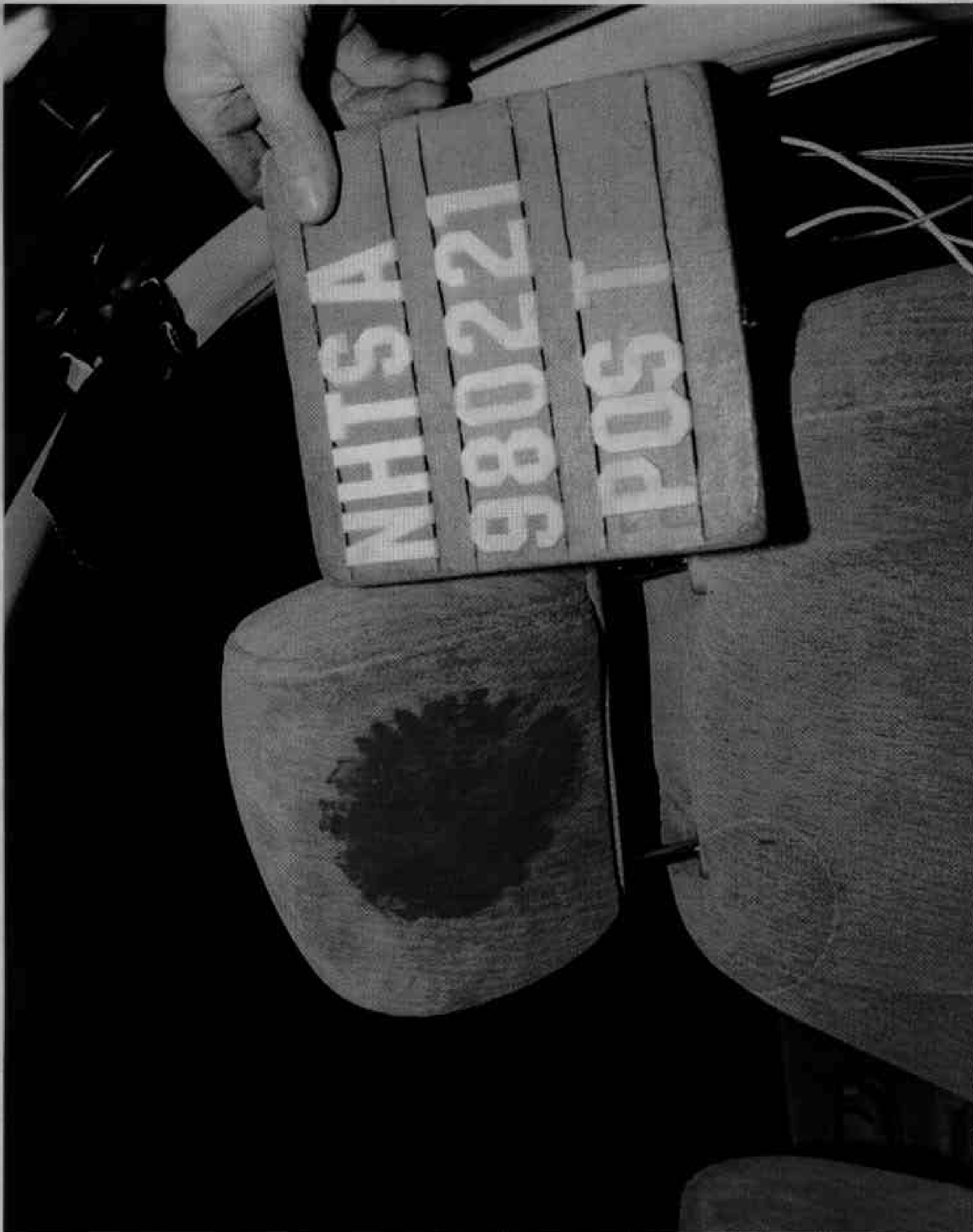


Figure A-42 Post-Test Driver Dummy Head Contact - View 3

Figure A-43 Post-Test Driver Dummy Knee Contact - View 1

Figure A-44 Post-Test Driver Dummy Knee Contact - View 2

Figure A-45 Post-Test Passenger Dummy View

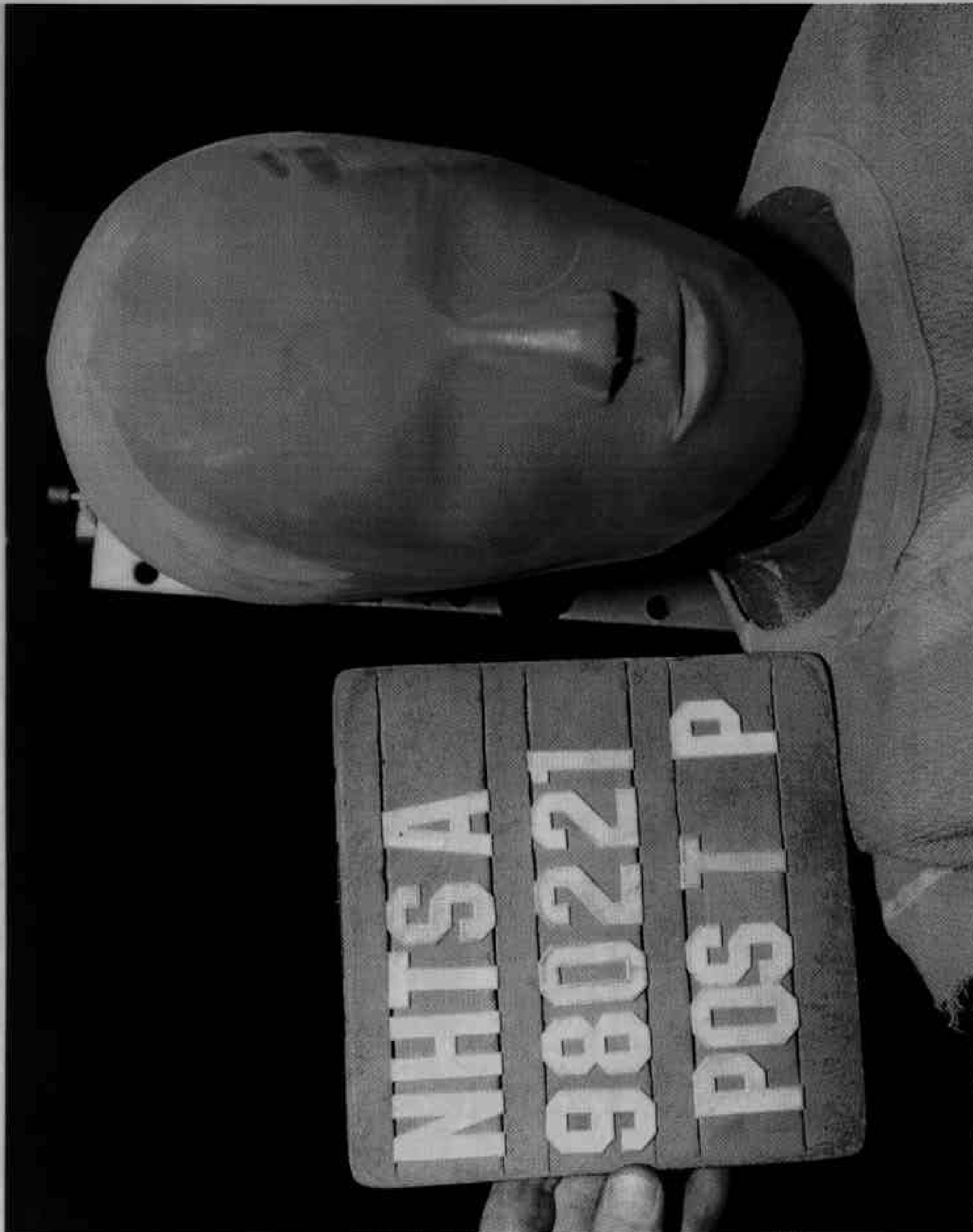


Figure A-46 Post-Test Passenger Dummy Head Contact - View 1

Figure A-47 Post-Test Passenger Dummy Head Contact - View 2

Figure A-48 Post-Test Passenger Dummy Head Contact - View 3

Figure A-49 Post-Test Passenger Dummy Knee Contact - View 1

Figure A-50 Post-Test Passenger Dummy Knee Contact - View 2

Figure A-51 Pre-Test Vehicle Certification Label View

Figure A-52 Pre-Test Tire Load Label View

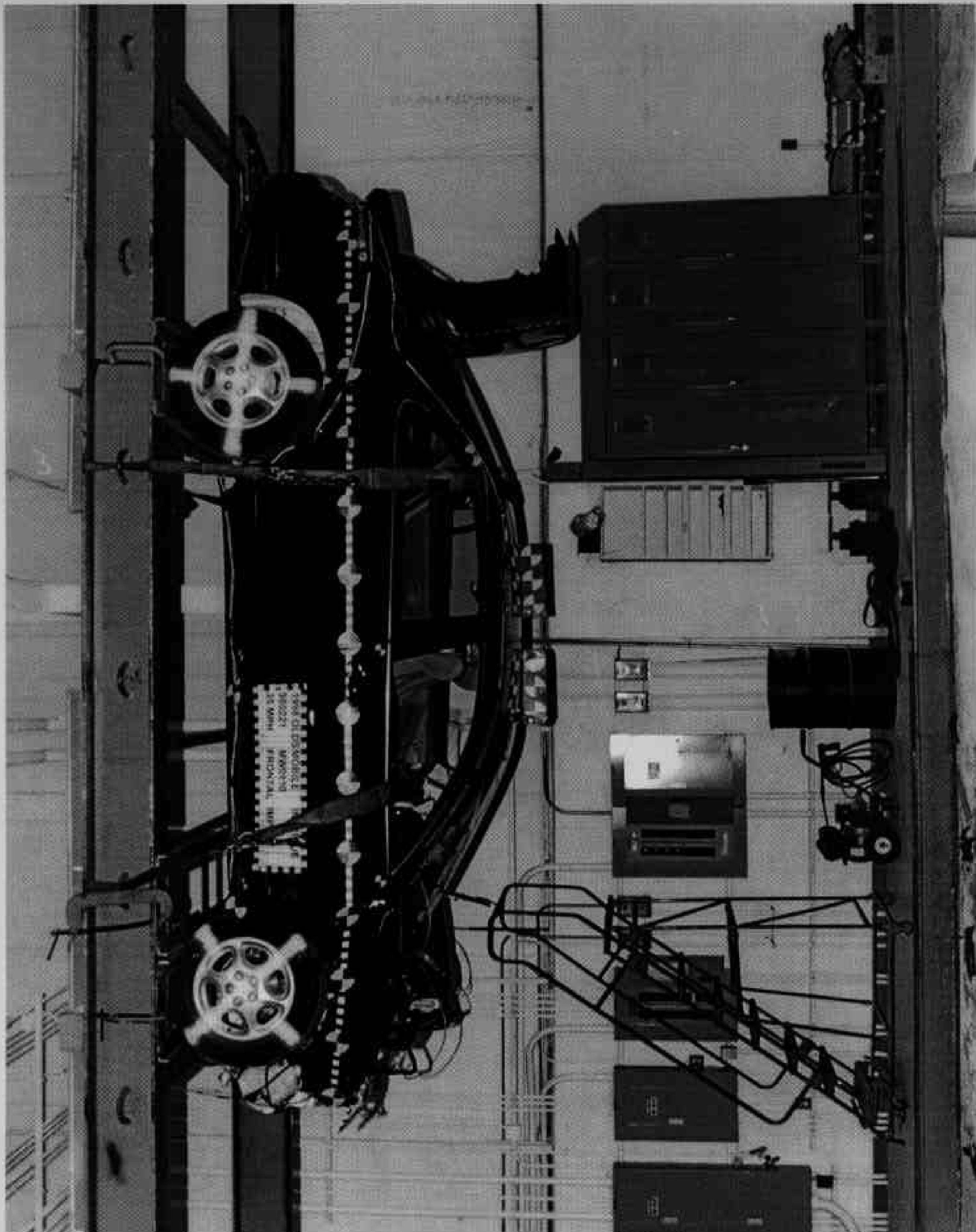
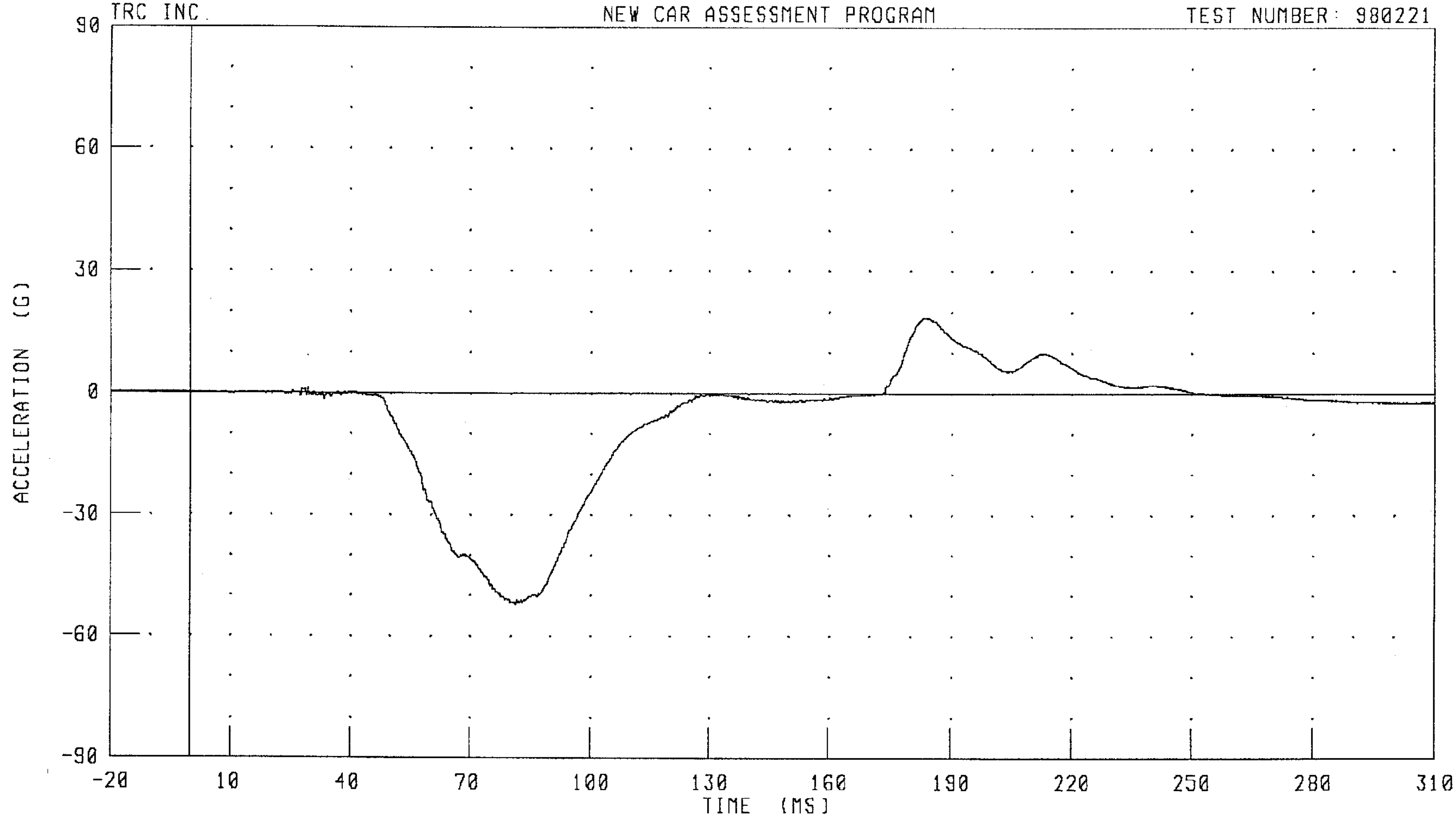


Figure A-53 Post-Test Vehicle On Static Rollover Device

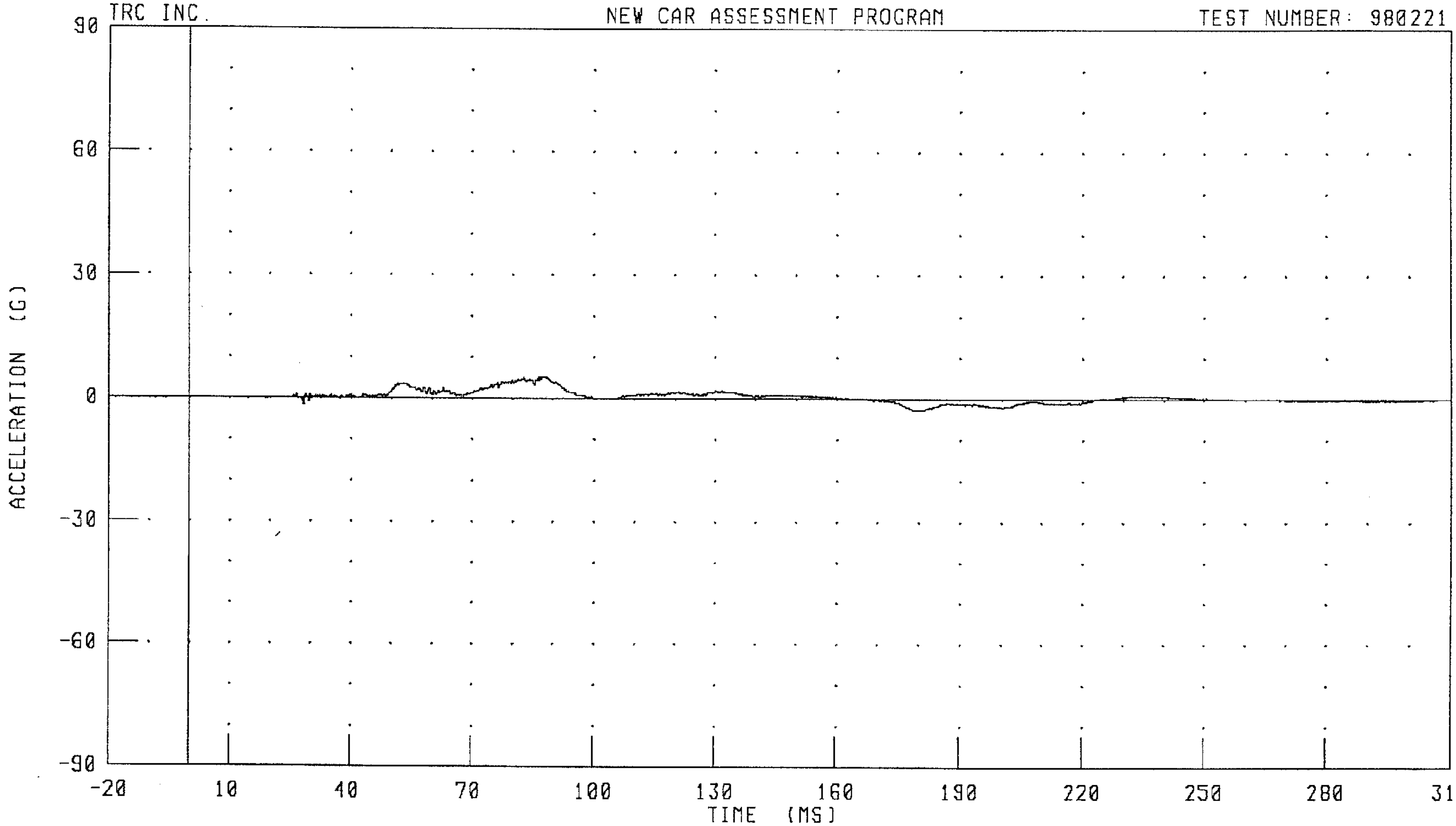
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: HEDXG1   FILTER: CH. CLASS 1000   PEAK DATA: 18.67 G @ 183.68 MS; -52.32 G @ 81.36 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

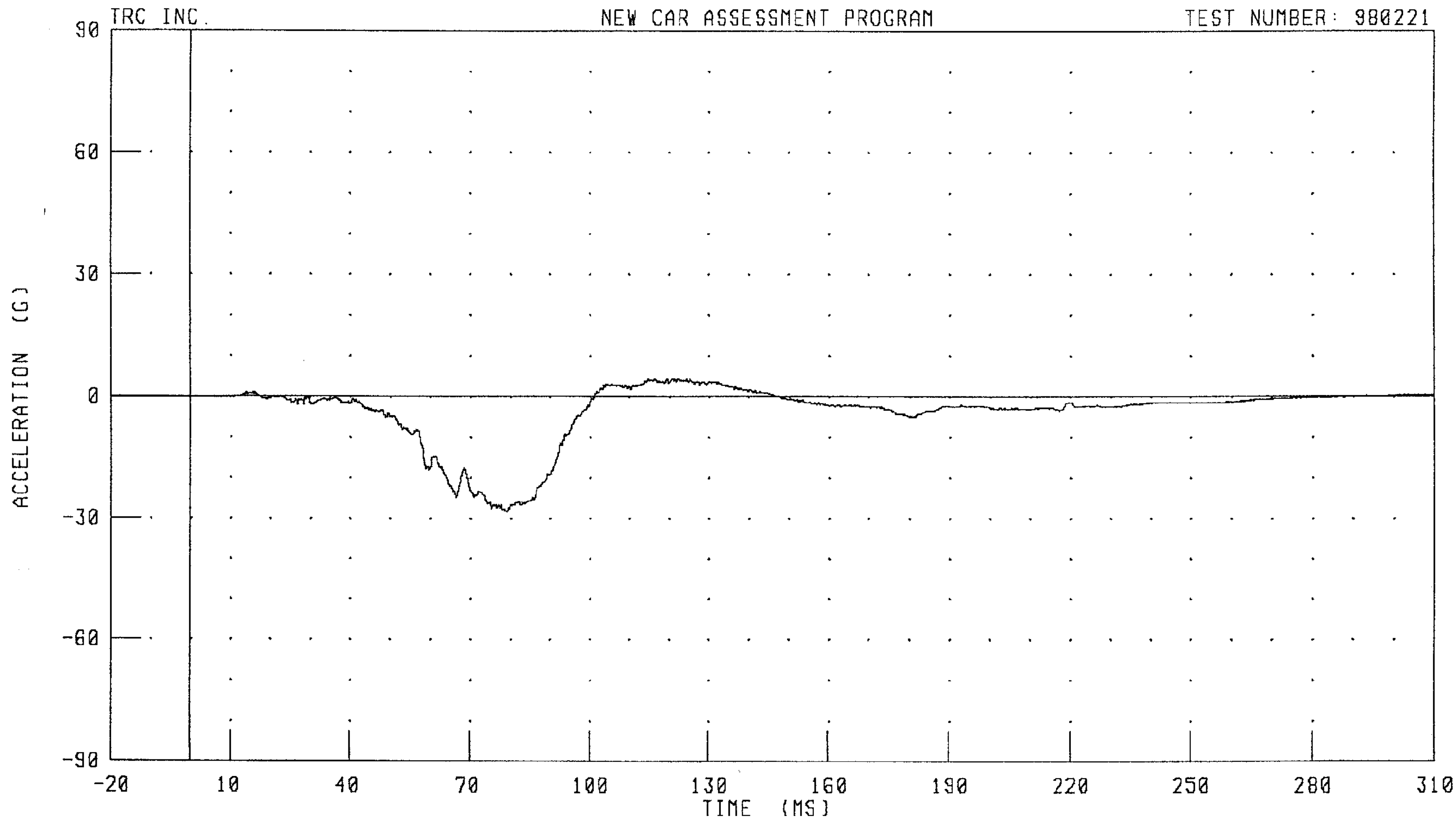
TRC INC. TEST NUMBER: 980221



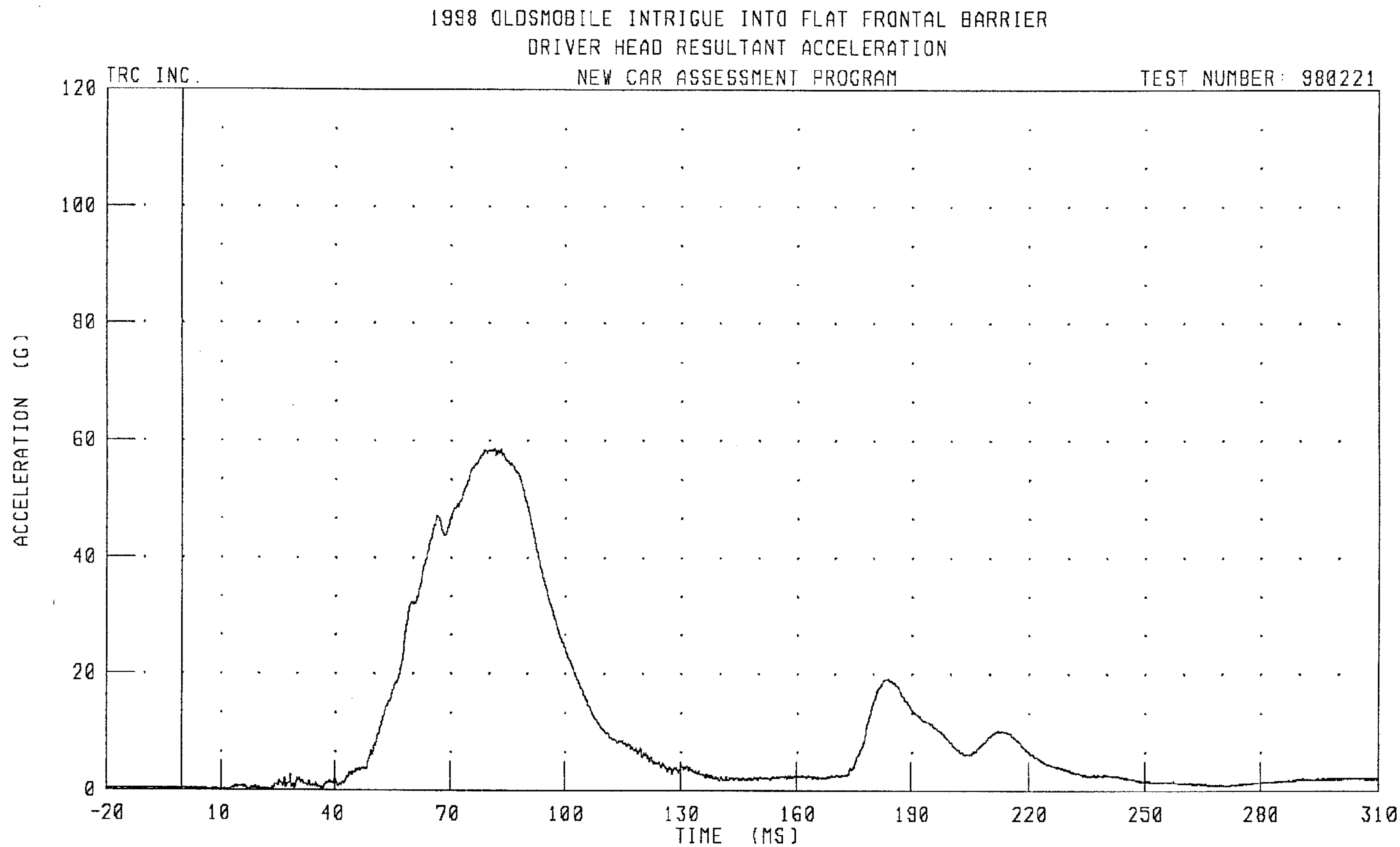
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 5.22 G @ 87.36 MS; -2.87 G @ 179.36 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

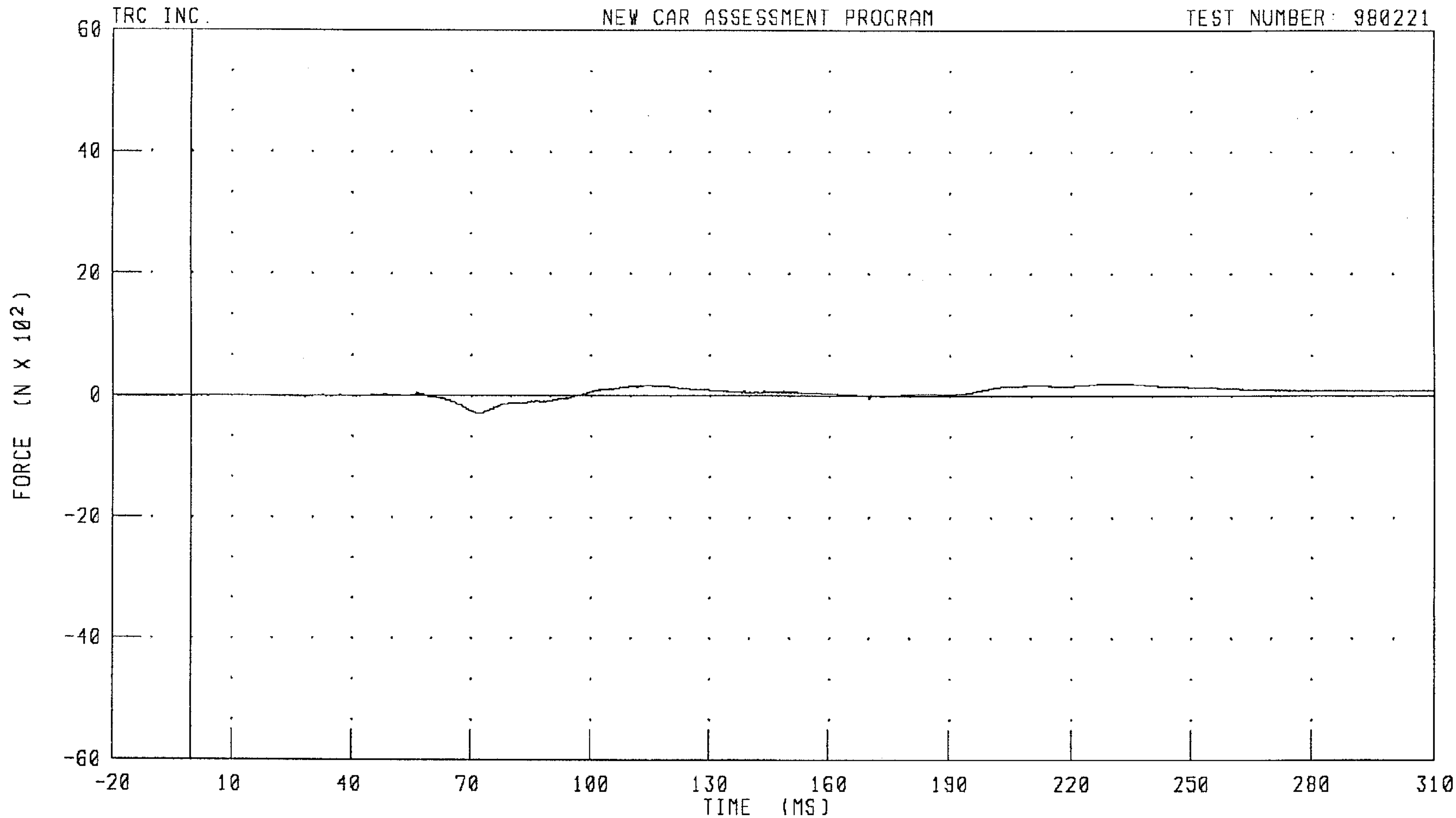


CHANNEL: HEDZG1 FILTER: CH. CLASS 1000 PEAK DATA: 4.46 G @ 120.96 MS; -28.34 G @ 79.12 MS



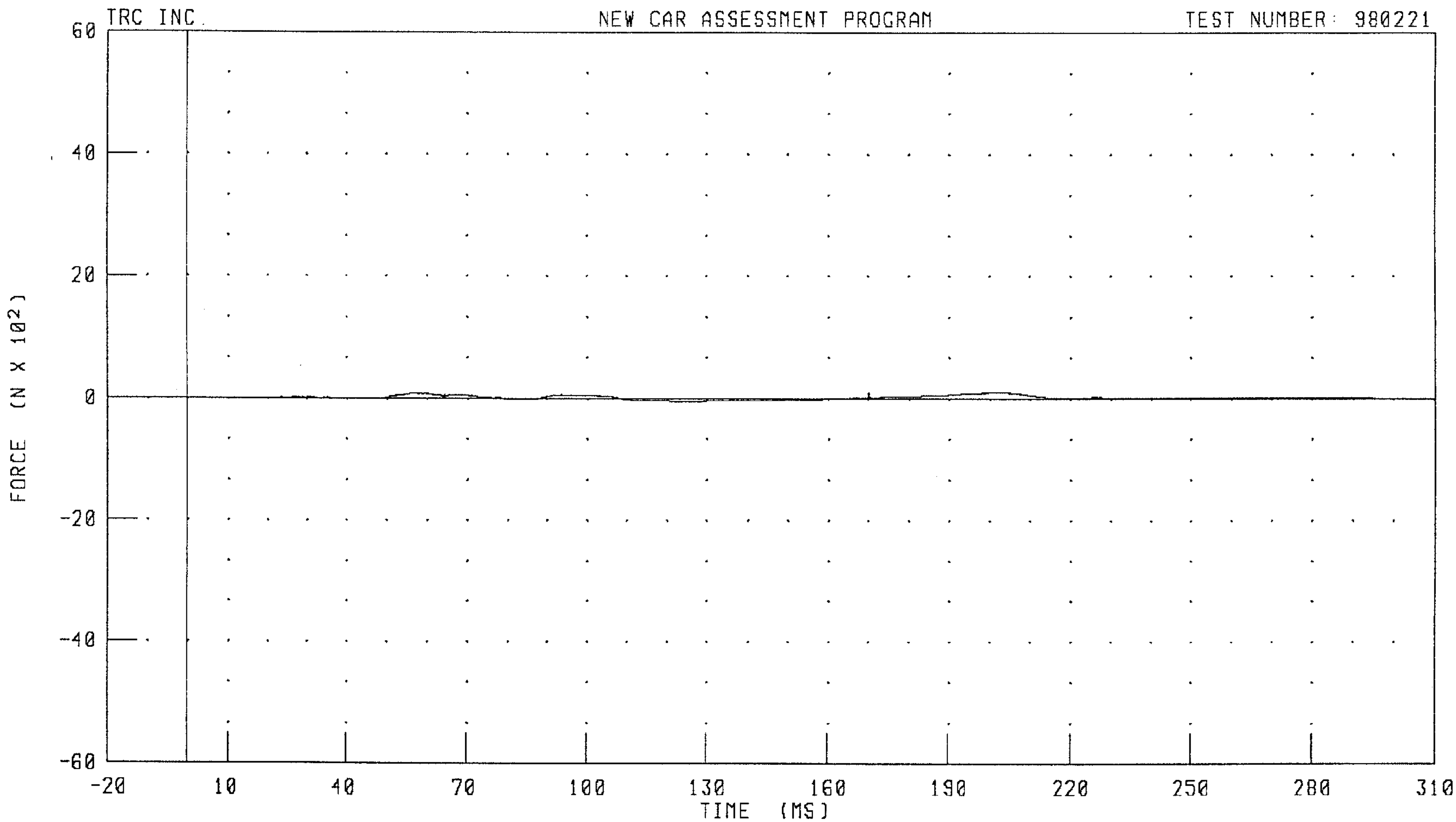
CHANNEL: HEDRG1 FILTER: CH. CLASS 1000 PEAK DATA: 58.58 G @ 81.44 MS; 0.11 G @ 9.68 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER NECK X-AXIS SHEAR FORCE
NEW CAR ASSESSMENT PROGRAM



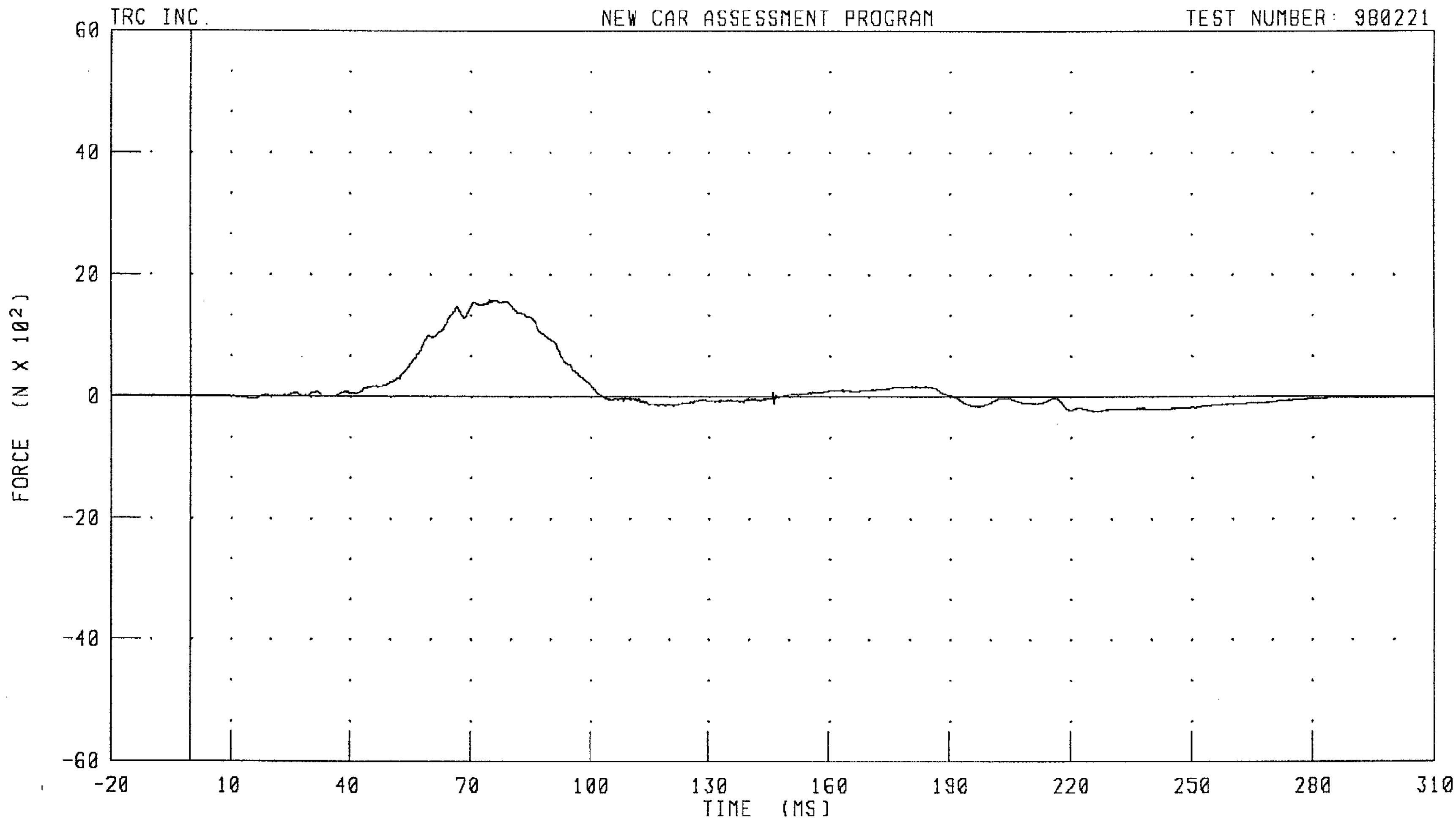
CHANNEL: NEKXF1 FILTER: CH. CLASS 1000 PEAK DATA: 212.16 N @ 230.48 MS; -287.39 N @ 71.92 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER NECK Y-AXIS SHEAR FORCE
NEW CAR ASSESSMENT PROGRAM



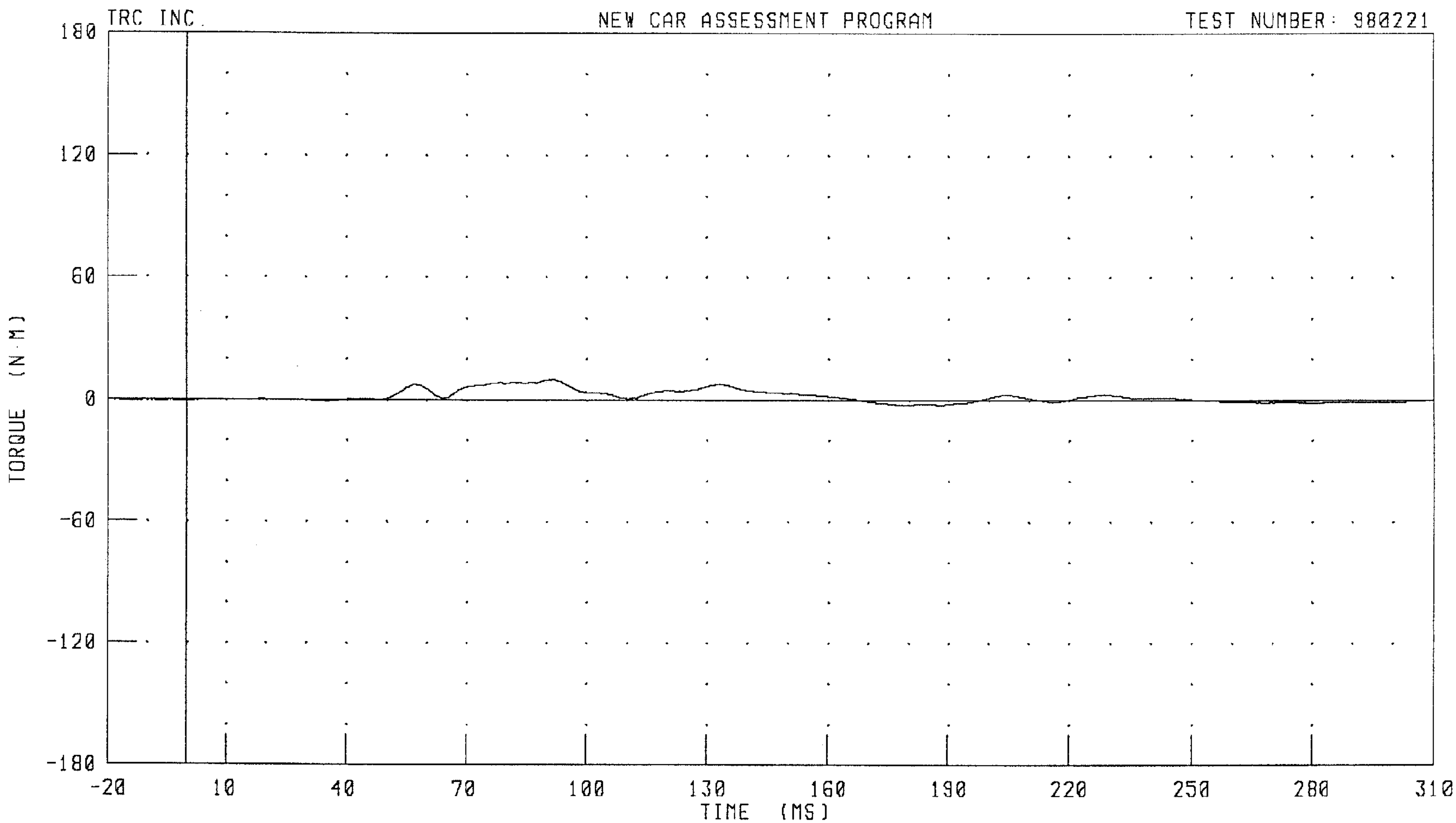
CHANNEL: NEKYF1 FILTER: CH. CLASS 1000 PEAK DATA: 99.55 N @ 200.56 MS; -56.94 N @ 123.52 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER NECK Z-AXIS AXIAL FORCE
NEW CAR ASSESSMENT PROGRAM



CHANNEL: NEKZF1 FILTER: CH. CLASS 1000 PEAK DATA: 1588.35 N @ 74.80 MS; -236.36 N @ 225.92 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER NECK MOMENT ABOUT X AXIS
NEW CAR ASSESSMENT PROGRAM

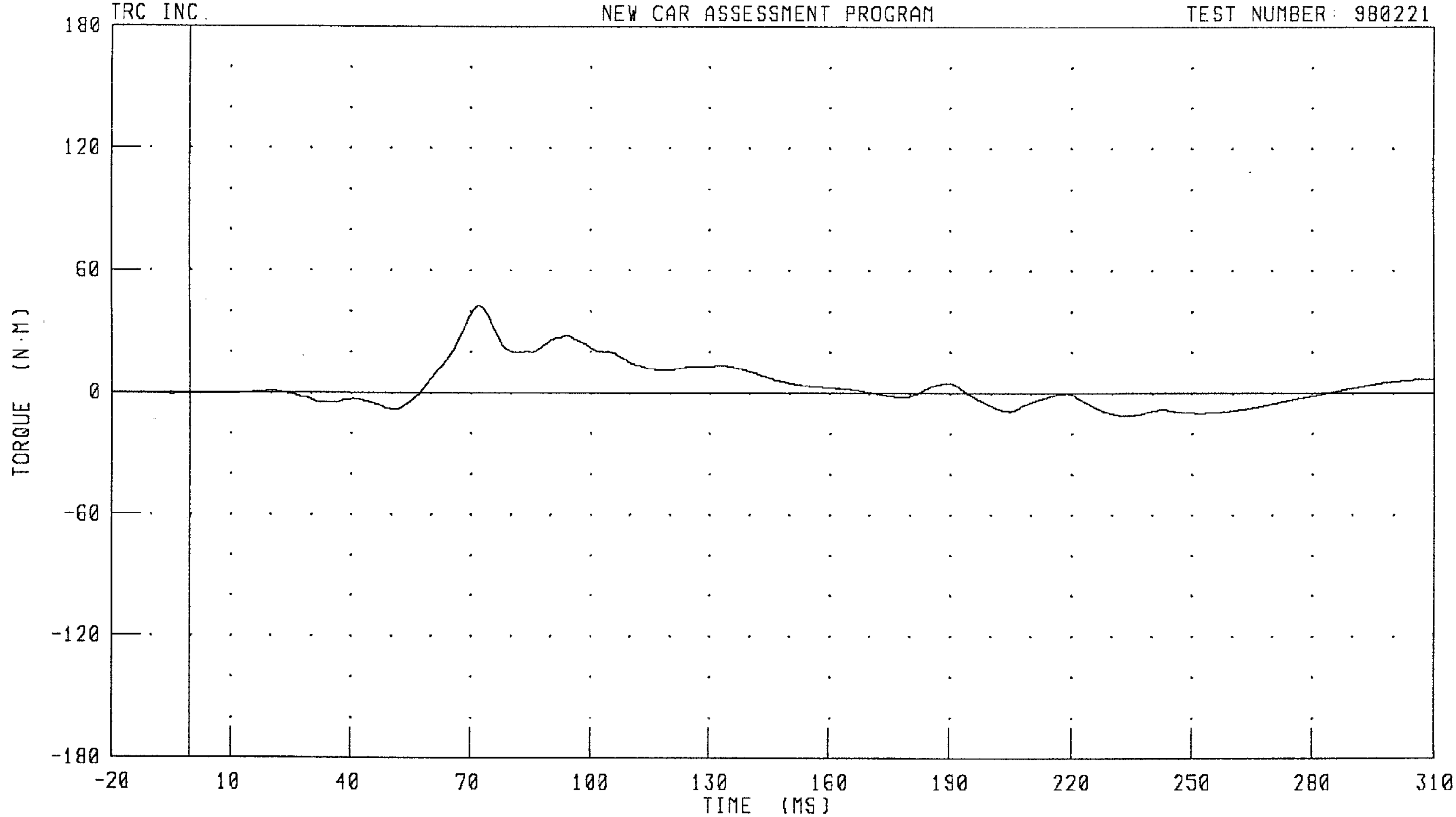


CHANNEL: NEKXM1 FILTER: CH. CLASS 600 PEAK DATA: 9.96 N·M @ 91.68 MS; -2.45 N·M @ 177.76 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER NECK MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM

TRC INC.

TEST NUMBER: 980221



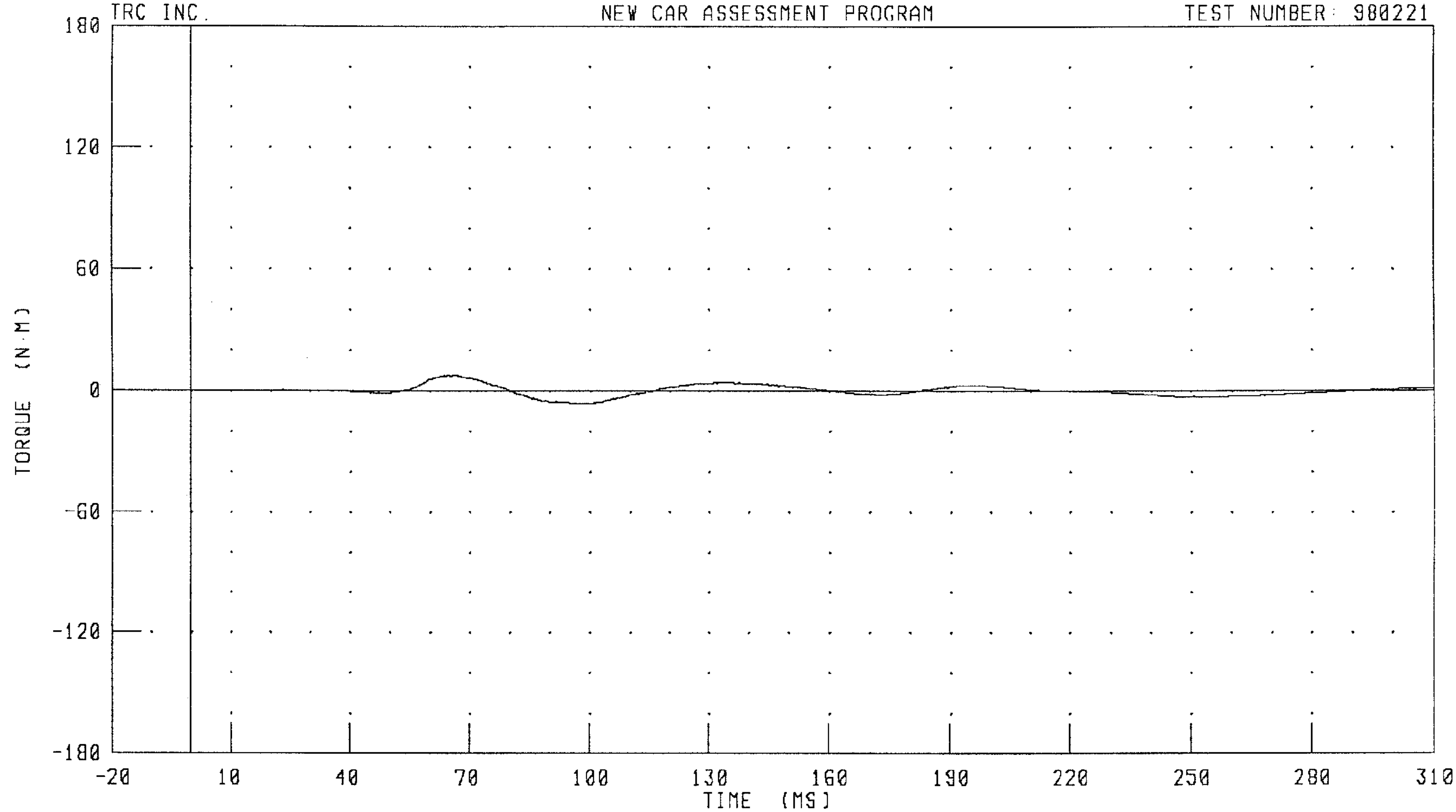
CHANNEL: NEKYM1 FILTER: CH. CLASS 600

PEAK DATA: 42.63 N·M @ 72.24 MS; -11.20 N·M @ 234.00 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS
NEW CAR ASSESSMENT PROGRAM

TRC INC.

TEST NUMBER: 980221

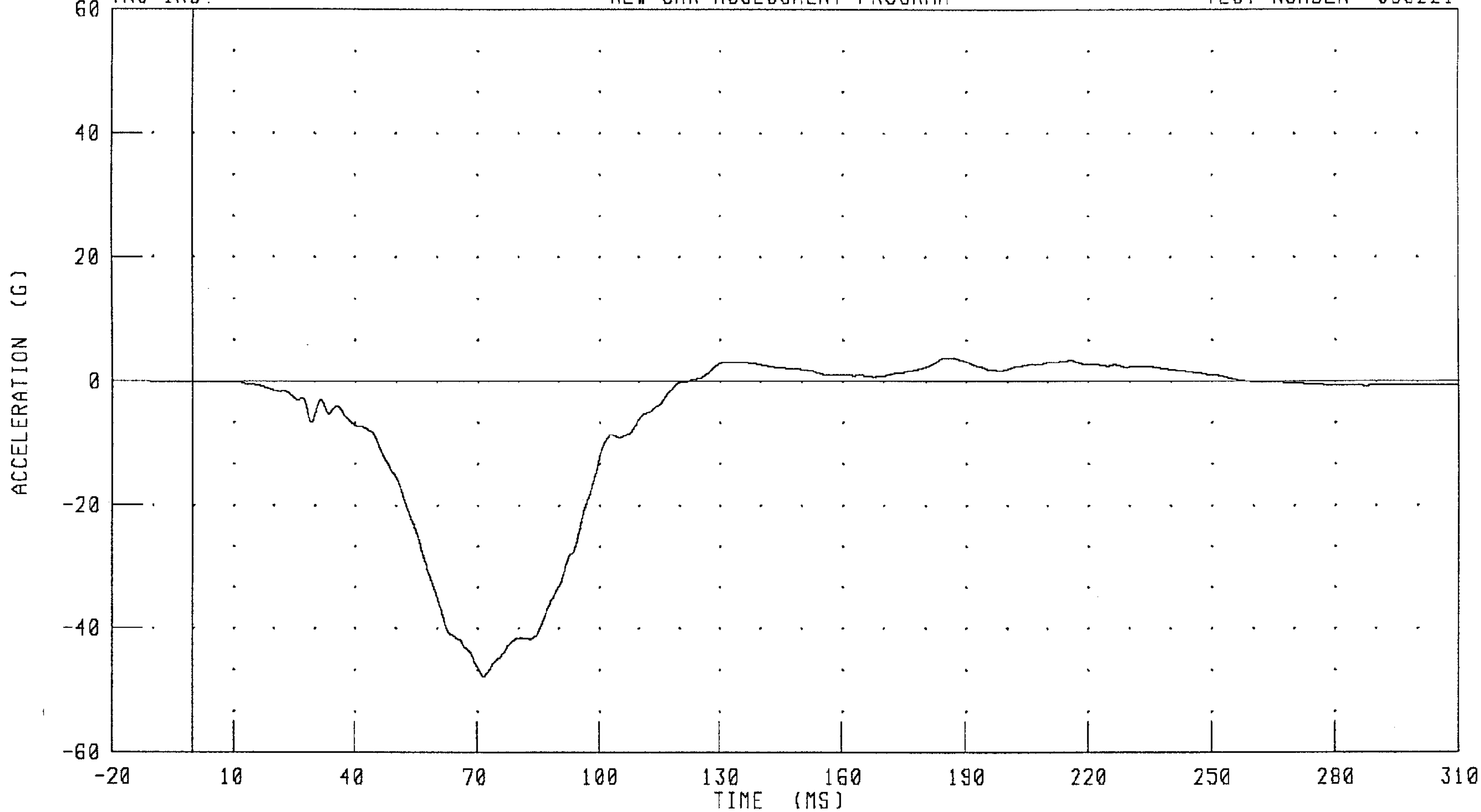


CHANNEL: NEKZM1 FILTER: CH. CLASS 600

PEAK DATA: 7.75 N·M @ 66.24 MS; -6.24 N·M @ 96.16 MS

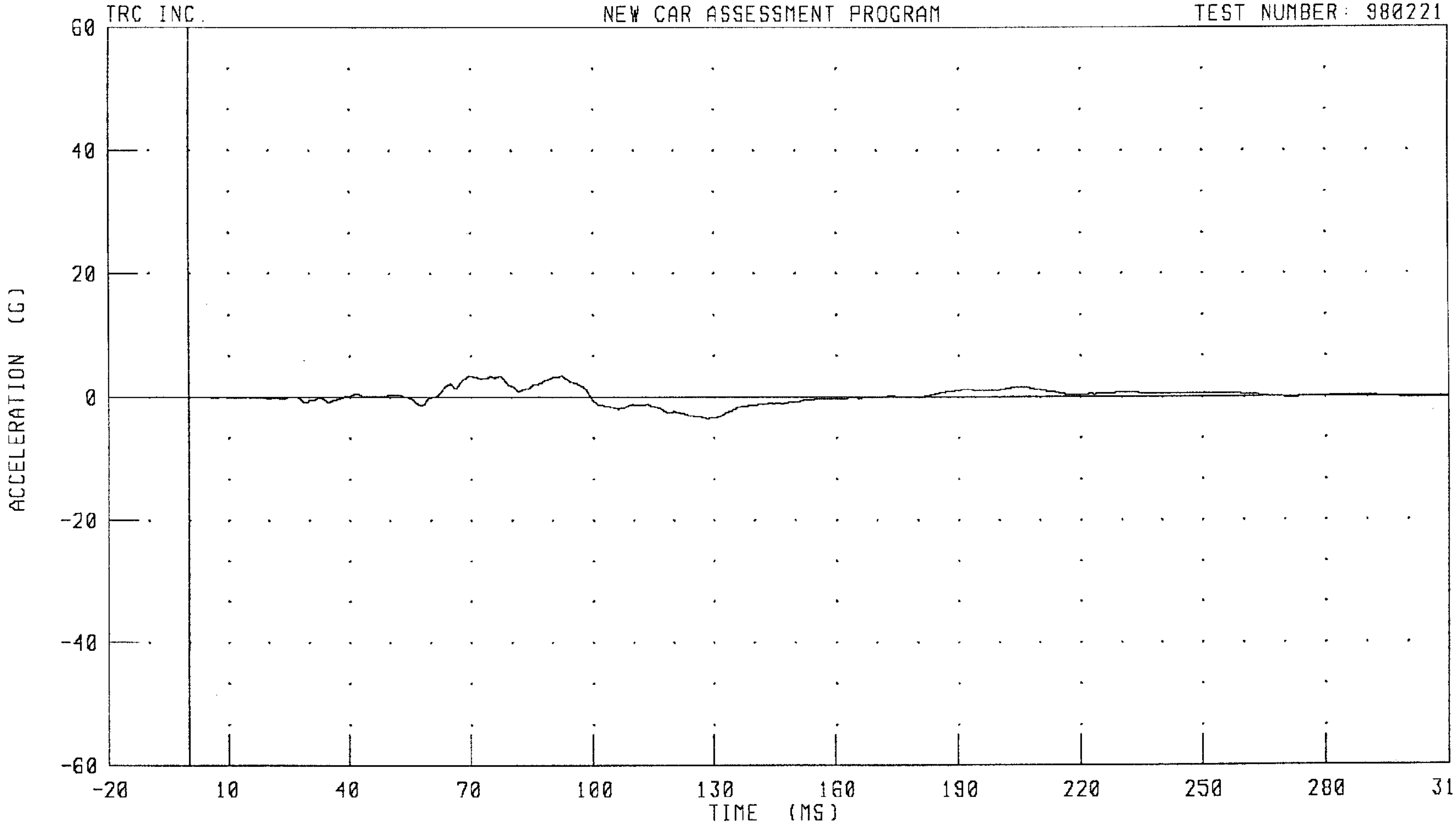
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221

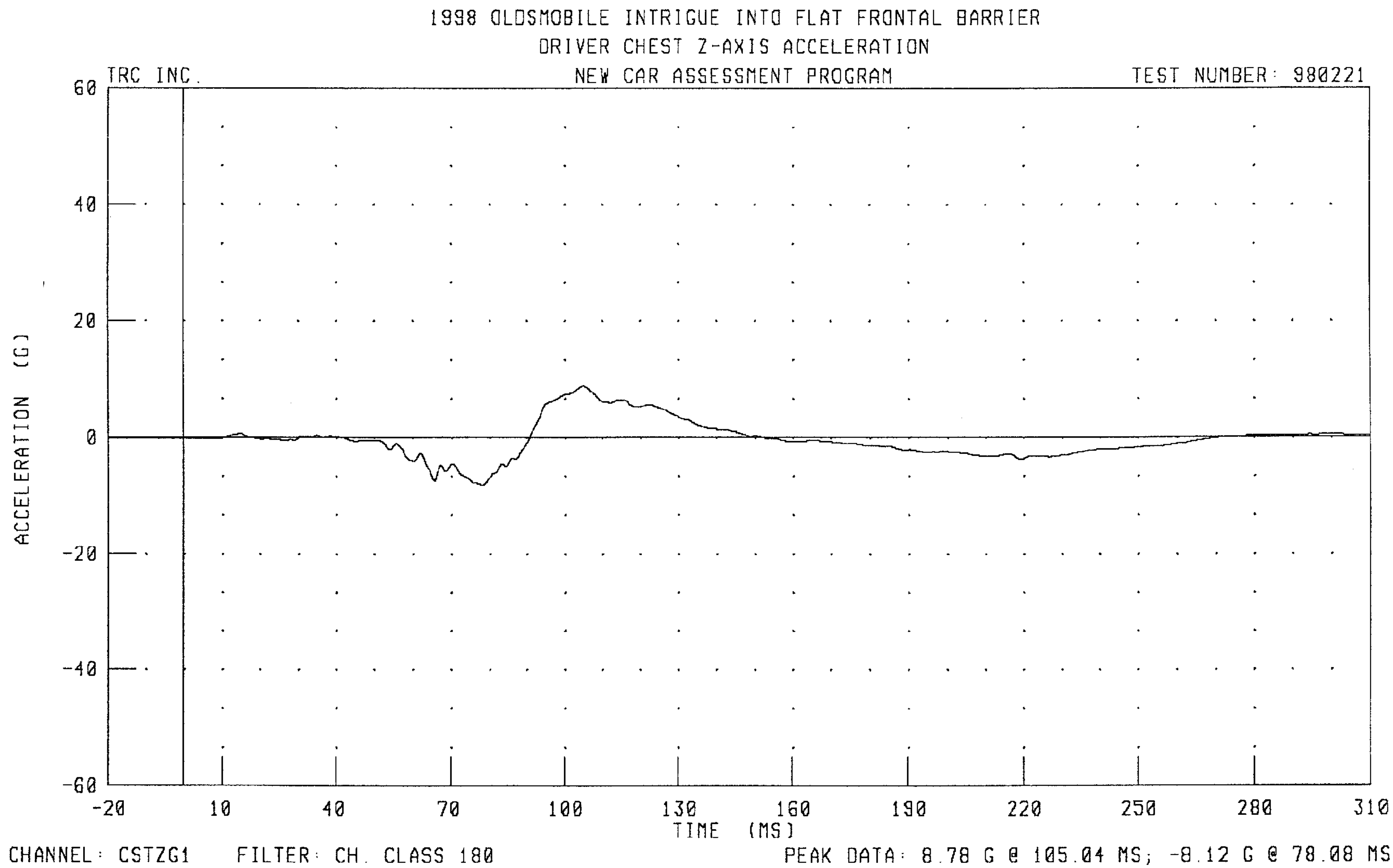


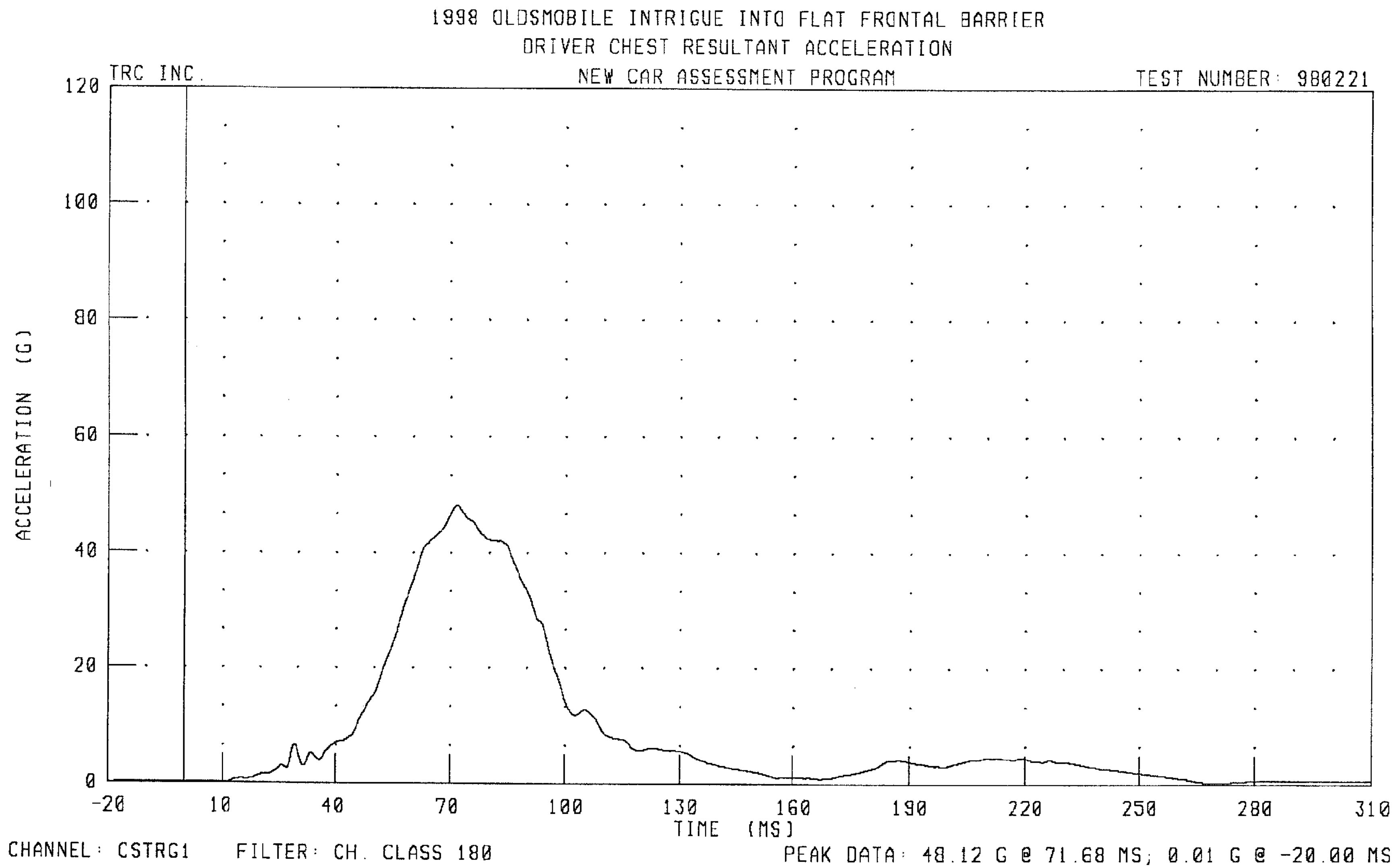
CHANNEL: CSTXG1 FILTER: CH. CLASS 180 PEAK DATA: 3.81 G @ 184.96 MS; -47.71 G @ 71.60 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



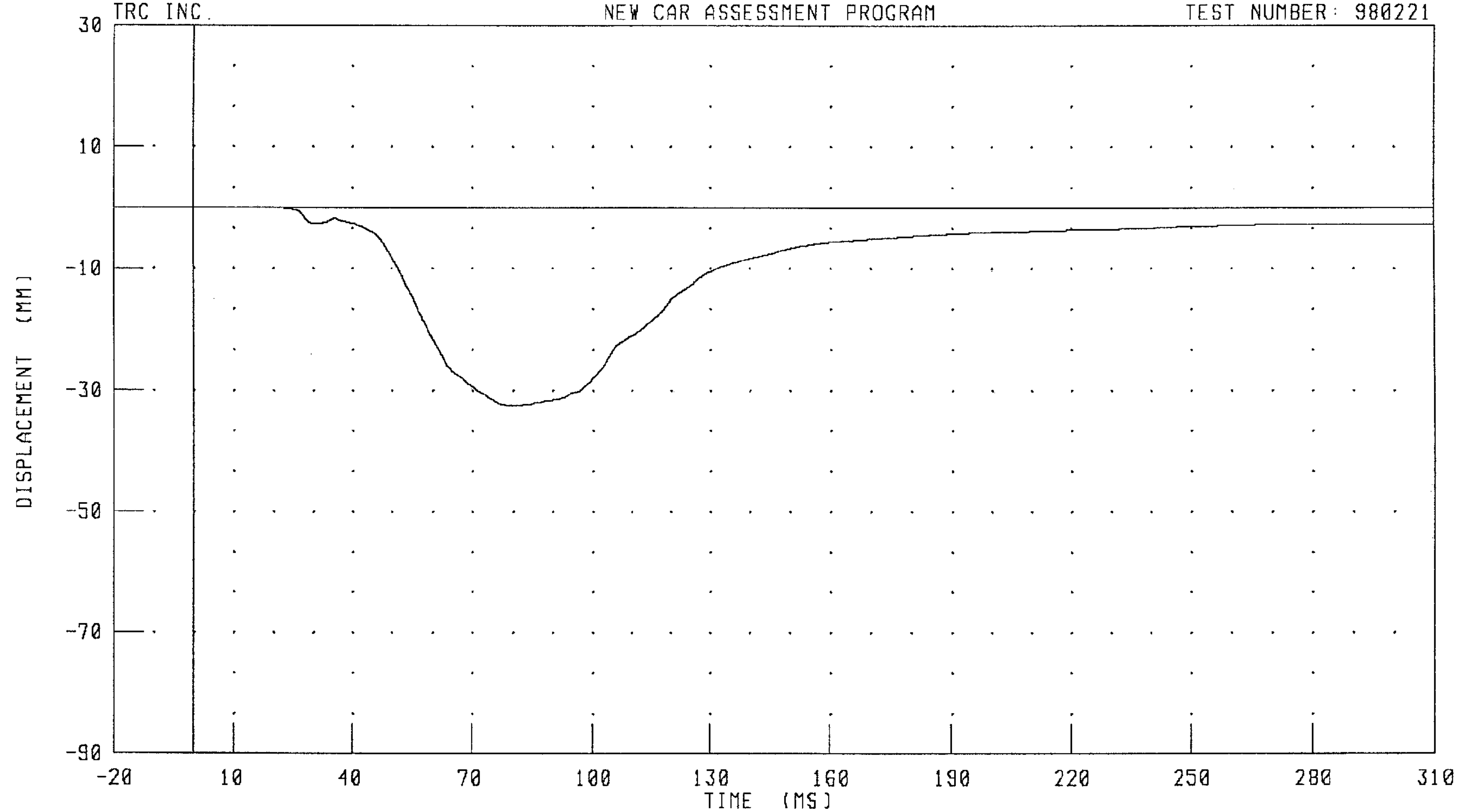
CHANNEL: CSTYG1   FILTER: CH. CLASS 180   PEAK DATA: 3.41 G @ 92.32 MS; -3.49 G @ 128.72 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZG1
FILTER: CH. CLASS 180
PEAK DATA: 8.78 G @ 105.04 MS; -8.12 G @ 78.08 MS

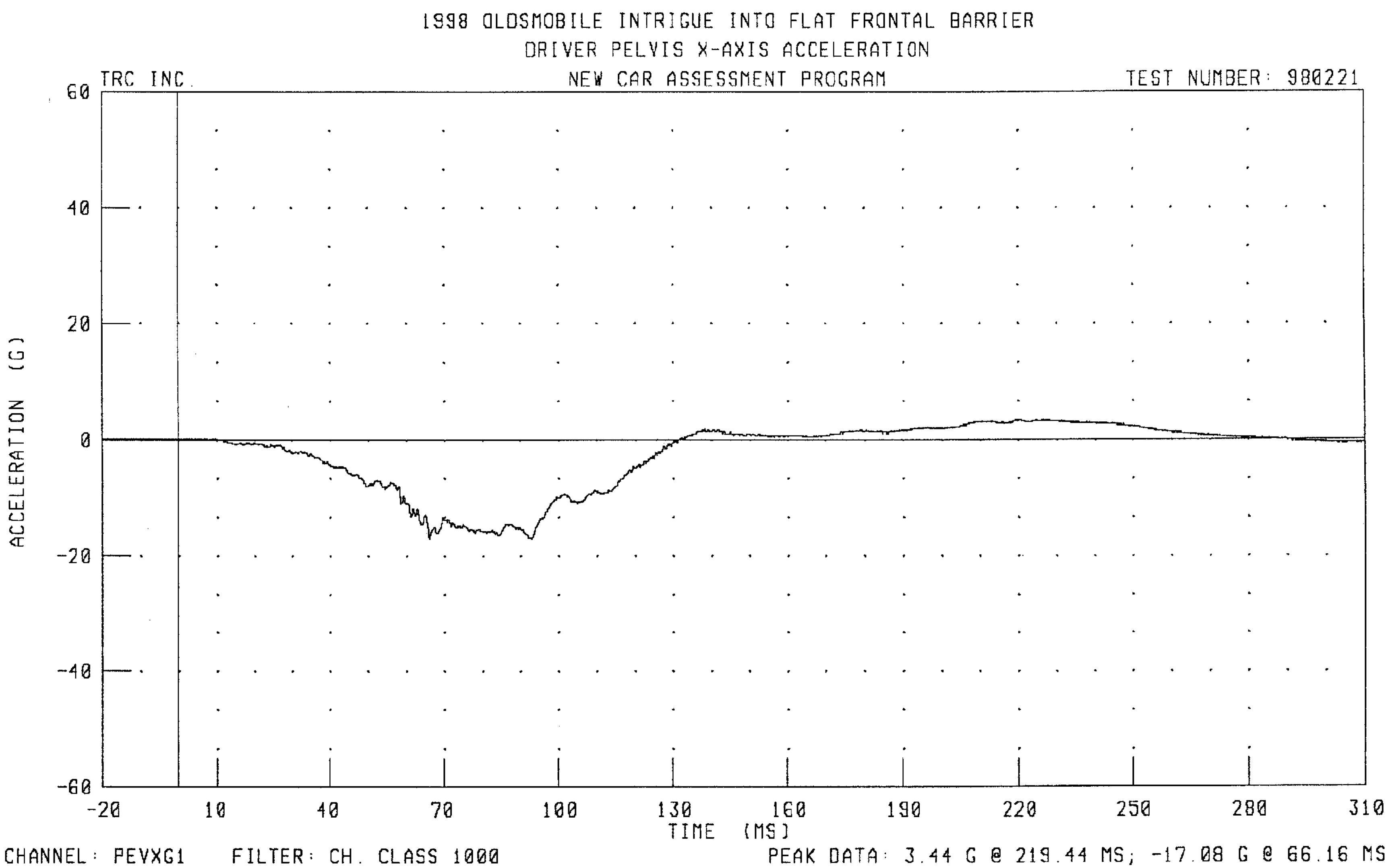

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
120
100
80
60
40
20
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRG1
FILTER: CH. CLASS 180
PEAK DATA: 48.12 G @ 71.68 MS; 0.01 G @ -20.00 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST DEFLECTION
NEW CAR ASSESSMENT PROGRAM

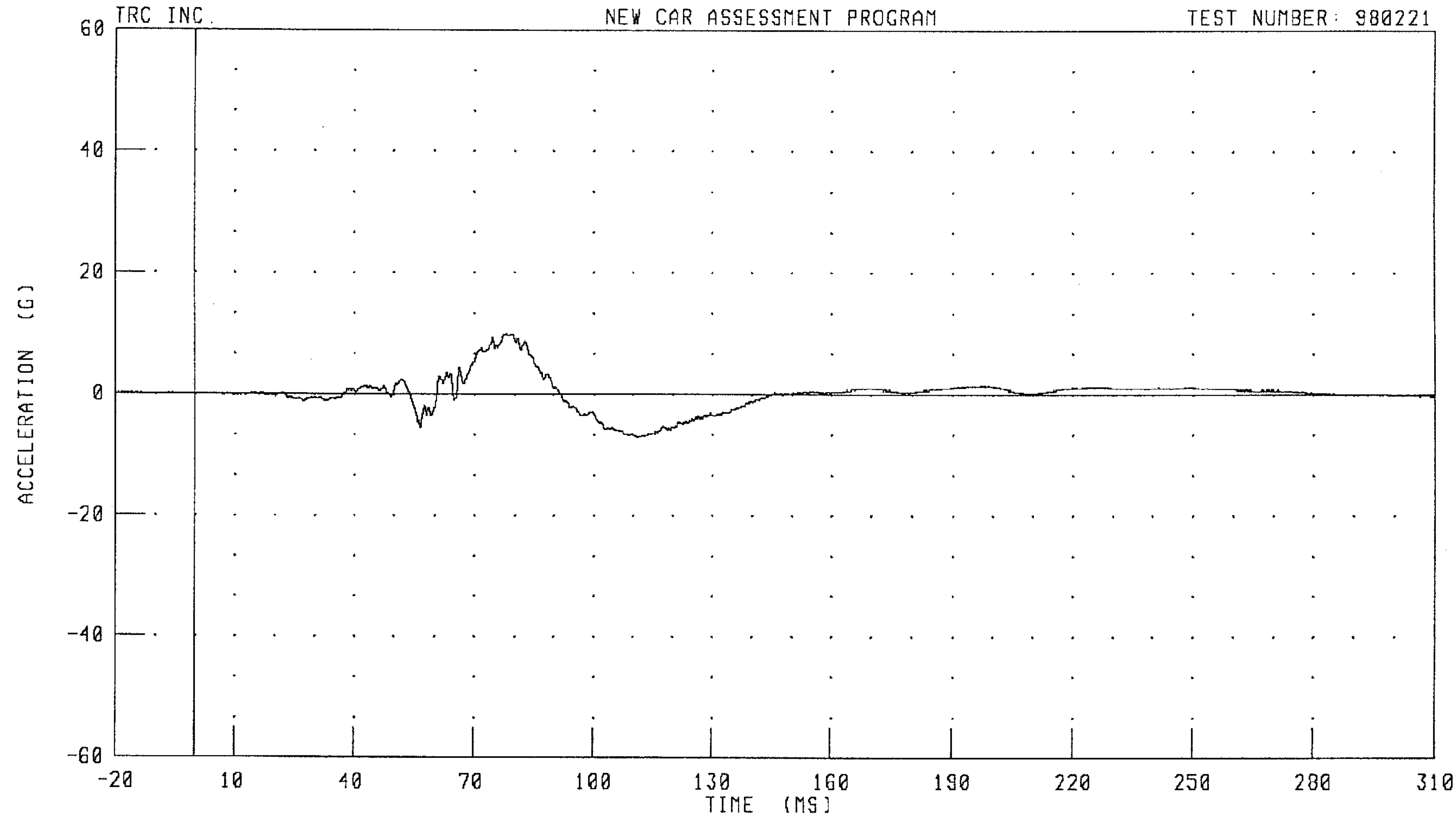
TRC INC. TEST NUMBER: 980221



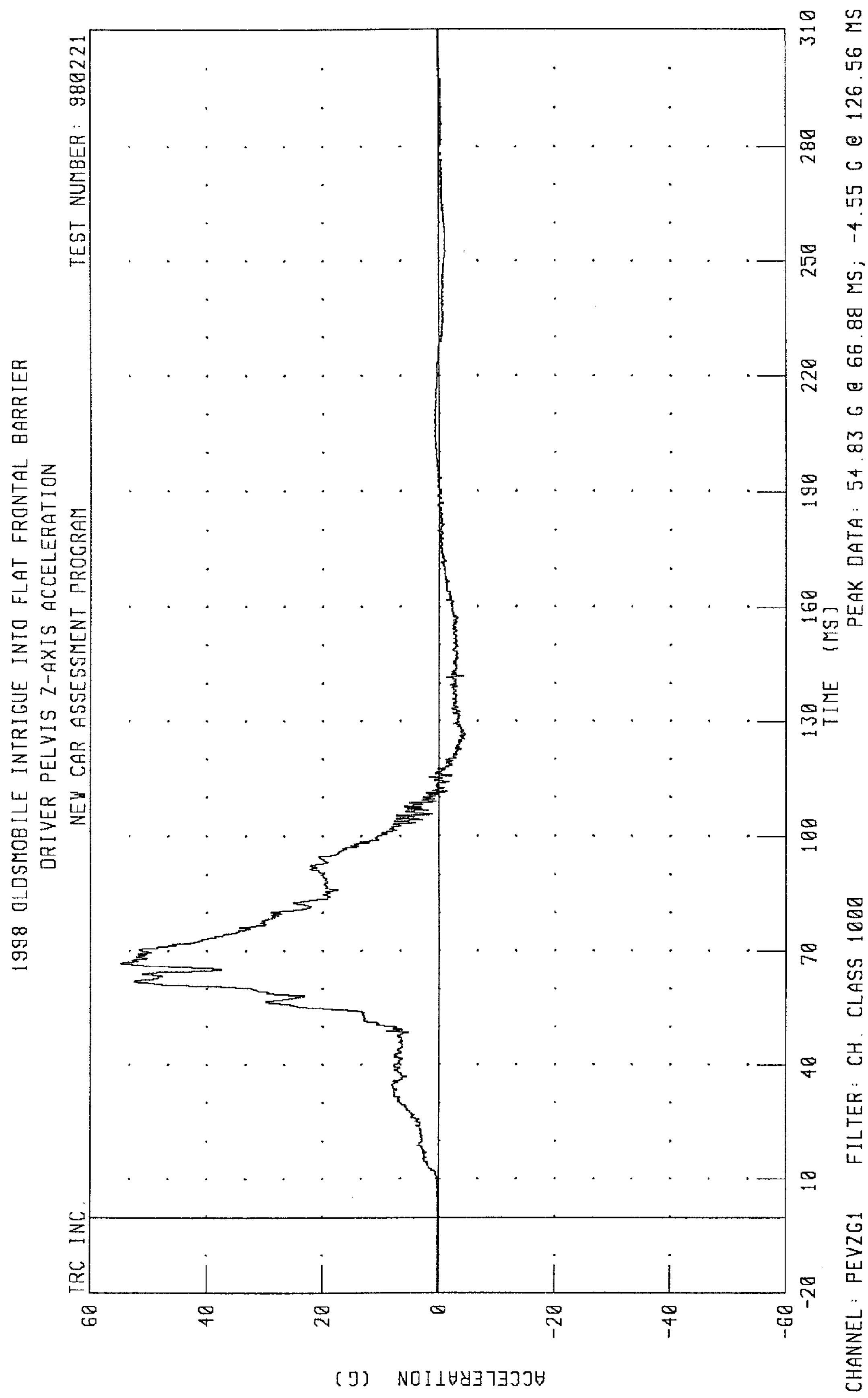
CHANNEL: CSTXD1 FILTER: CH. CLASS 180 PEAK DATA: 0.00 MM @ 7.60 MS; -32.57 MM @ 81.52 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER PELVIS X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVXG1
FILTER: CH. CLASS 1000
PEAK DATA: 3.44 G @ 219.44 MS; -17.08 G @ 66.16 MS

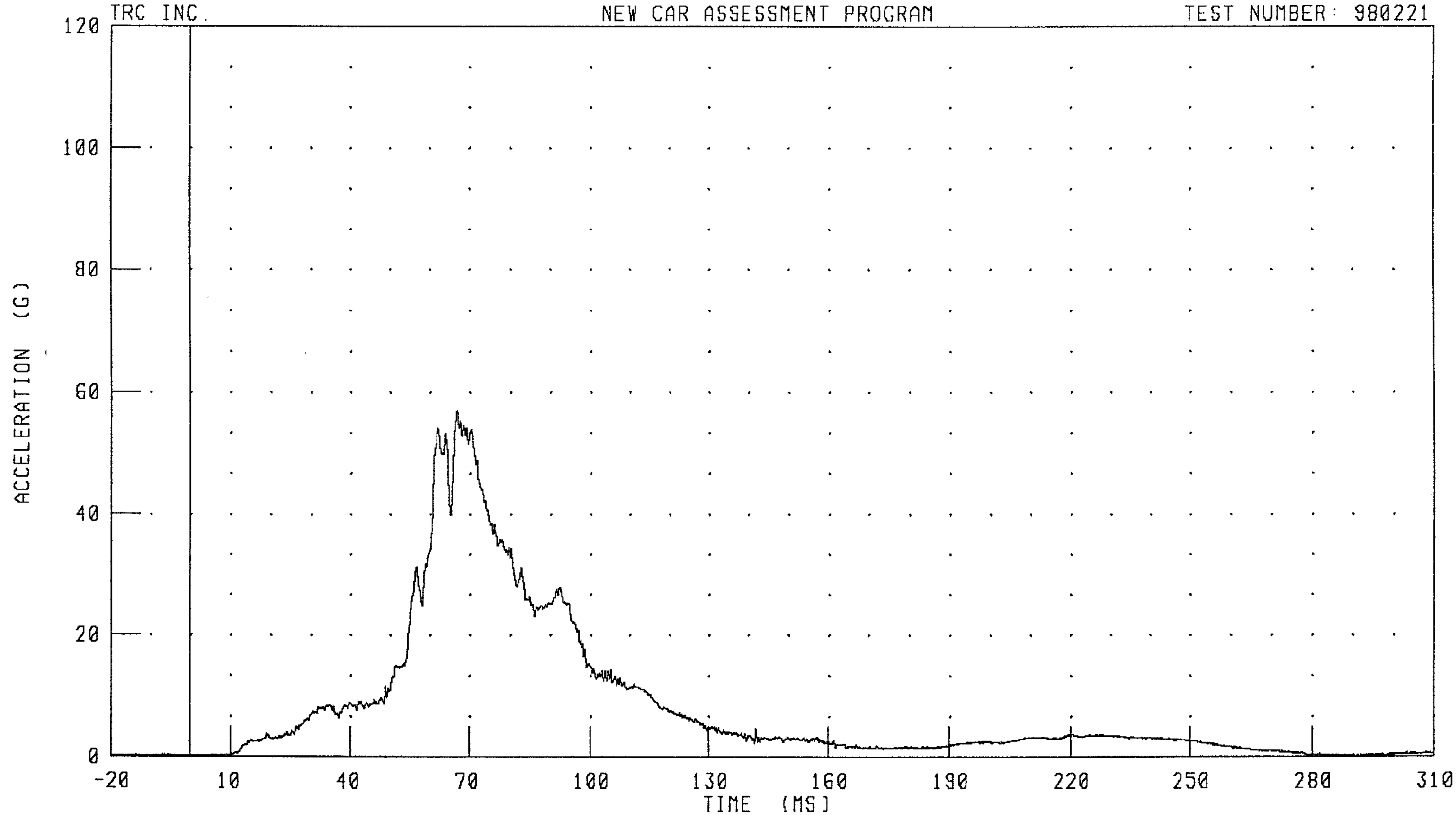
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER PELVIS Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



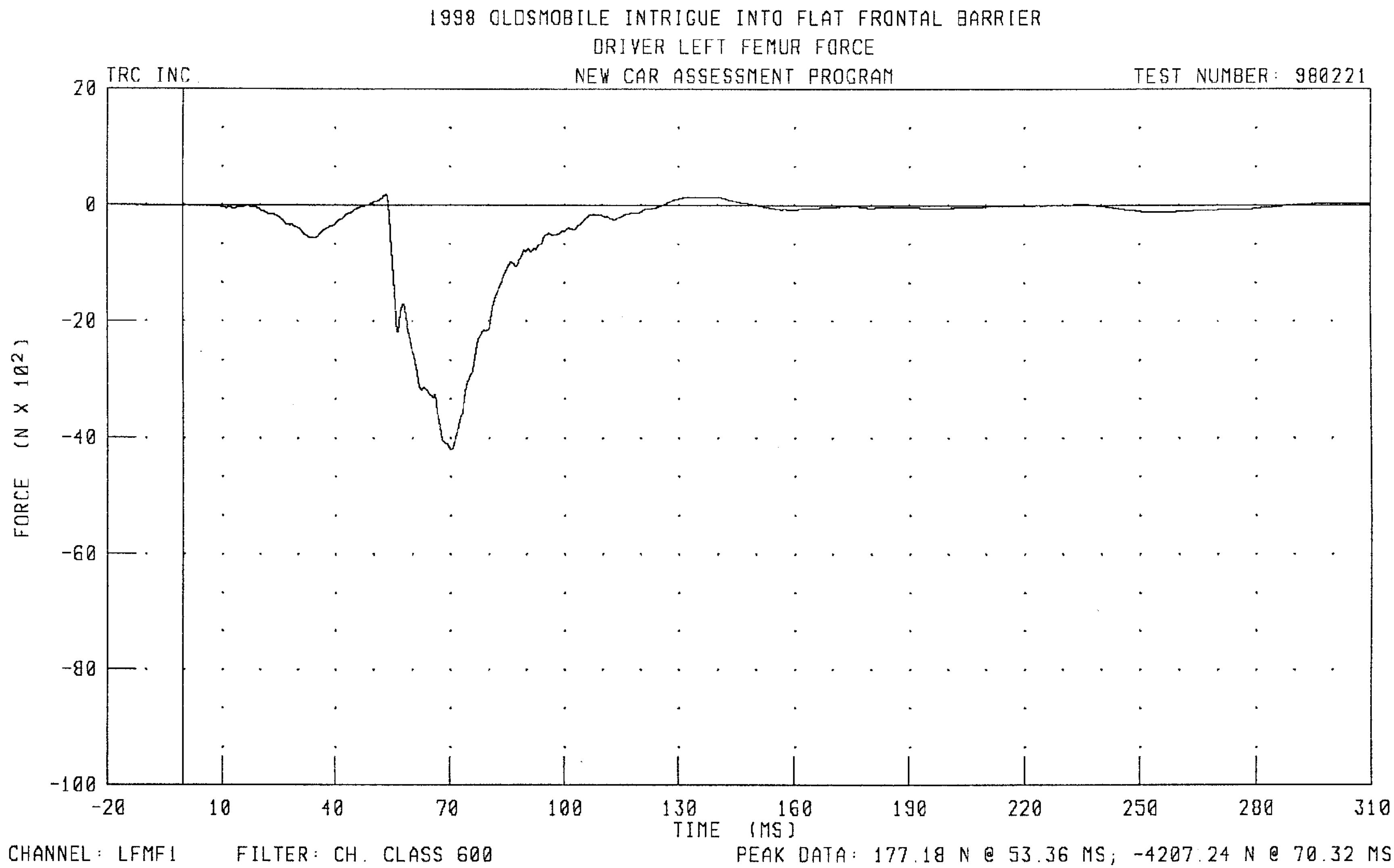
CHANNEL: PEVYG1 FILTER: CH. CLASS 1000 PEAK DATA: 10.06 G @ 78.08 MS; -7.13 G @ 111.04 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER PELVIS Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVZG1
FILTER: CH. CLASS 1000
PEAK DATA: 54.83 G @ 66.88 MS; -4.55 G @ 126.56 MS

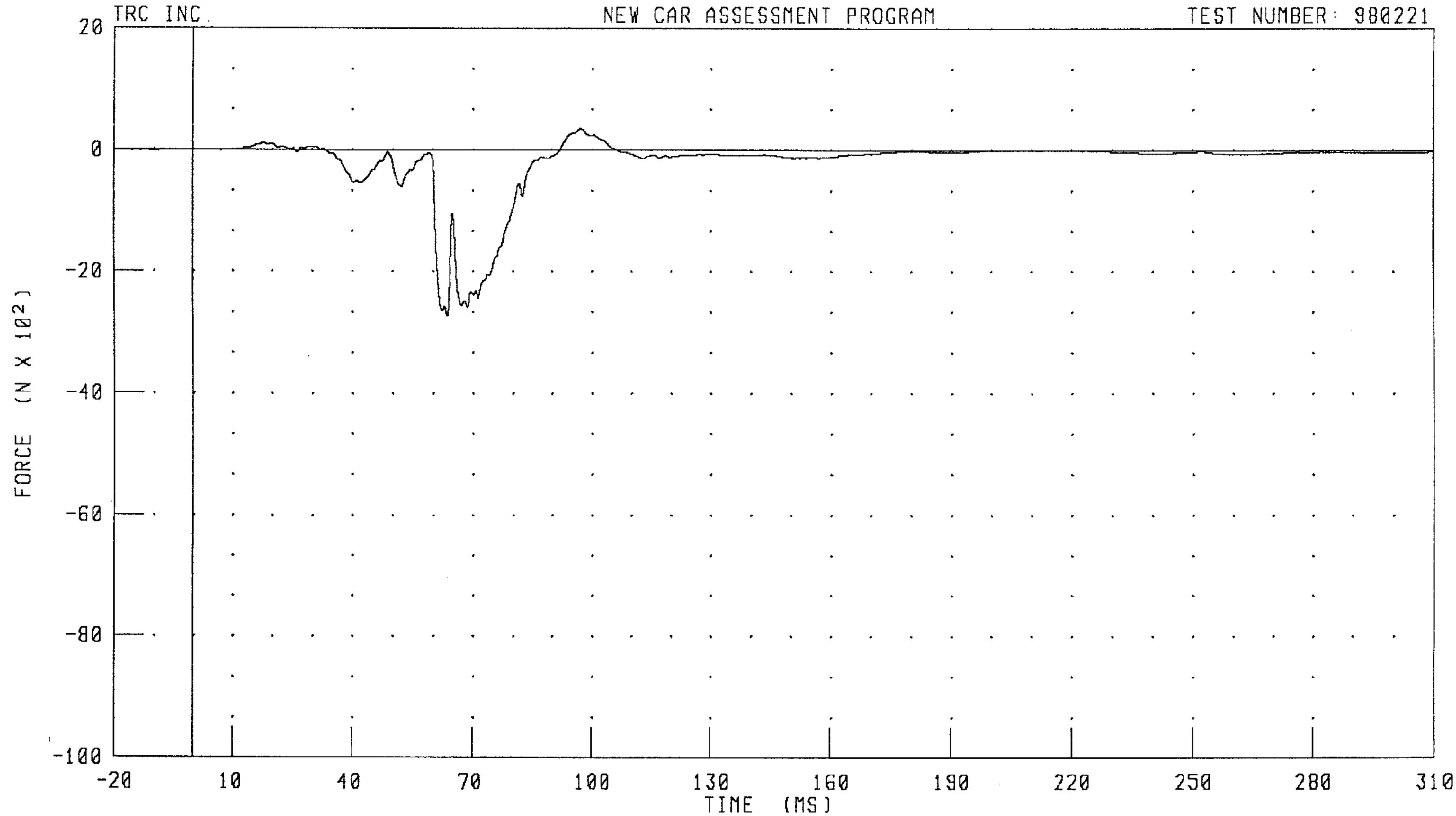
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER PELVIS RESULTANT ACCELERATION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: PEVRG1 FILTER: CH. CLASS 1000 PEAK DATA: 57.04 G @ 66.88 MS; 0.10 G @ 287.36 MS

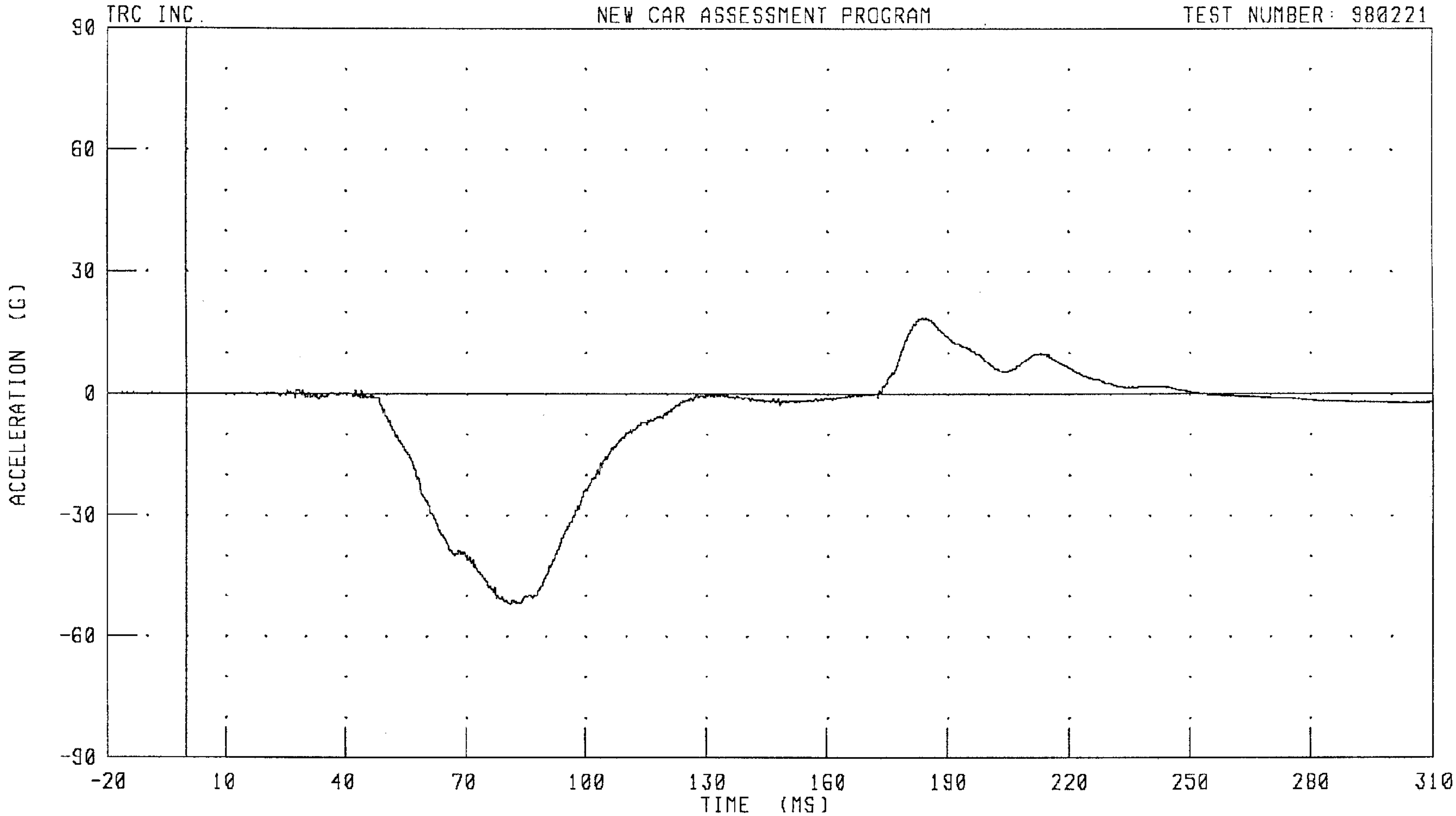

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
20
0
-20
-40
-60
-80
-100
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF1
FILTER: CH. CLASS 600
PEAK DATA: 177.18 N @ 53.36 MS; -4207.24 N @ 70.32 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE
NEW CAR ASSESSMENT PROGRAM



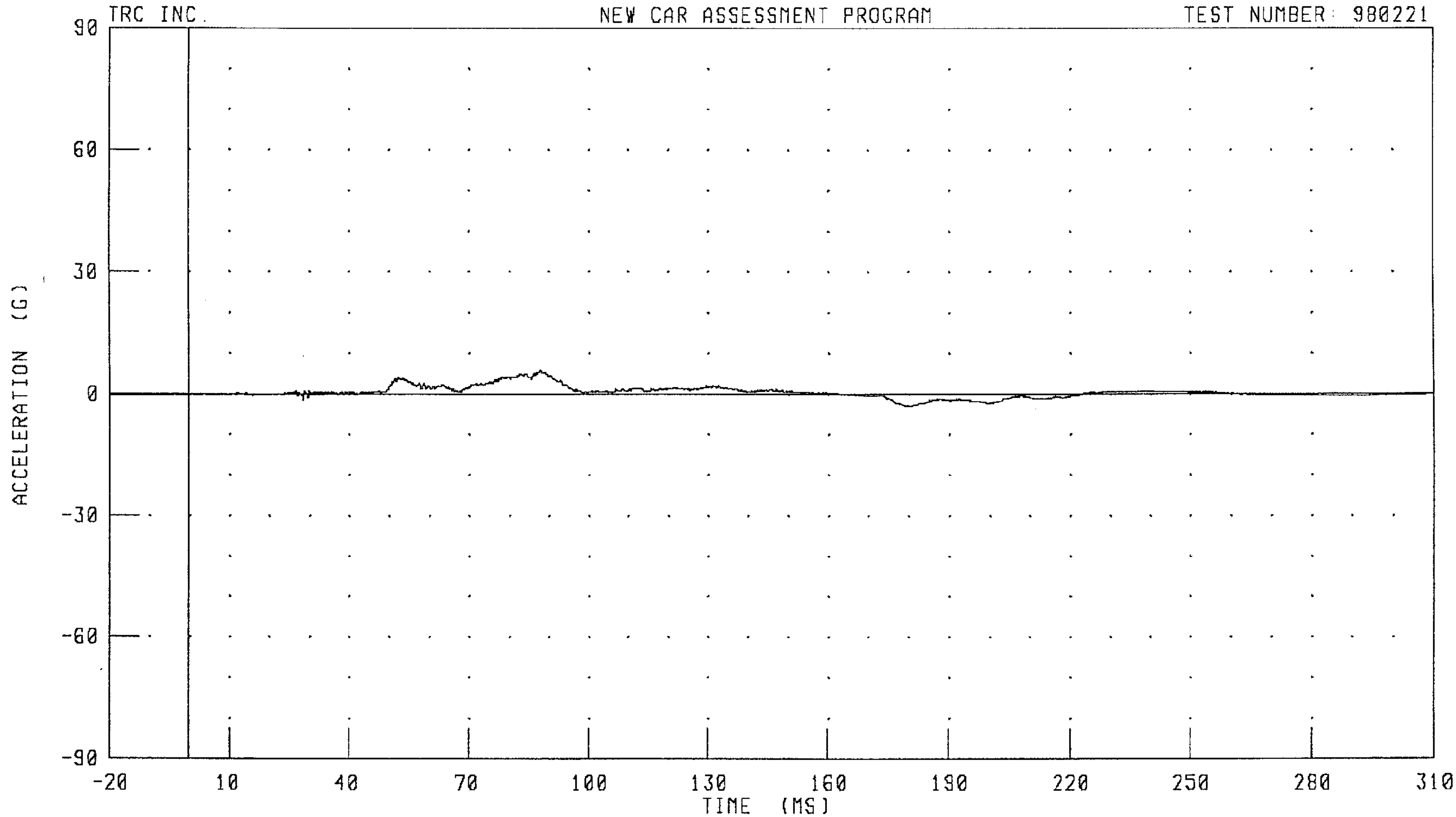
CHANNEL: RFMF1 FILTER: CH. CLASS 600 PEAK DATA: 348.97 N @ 97.20 MS; -2726.53 N @ 63.76 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM



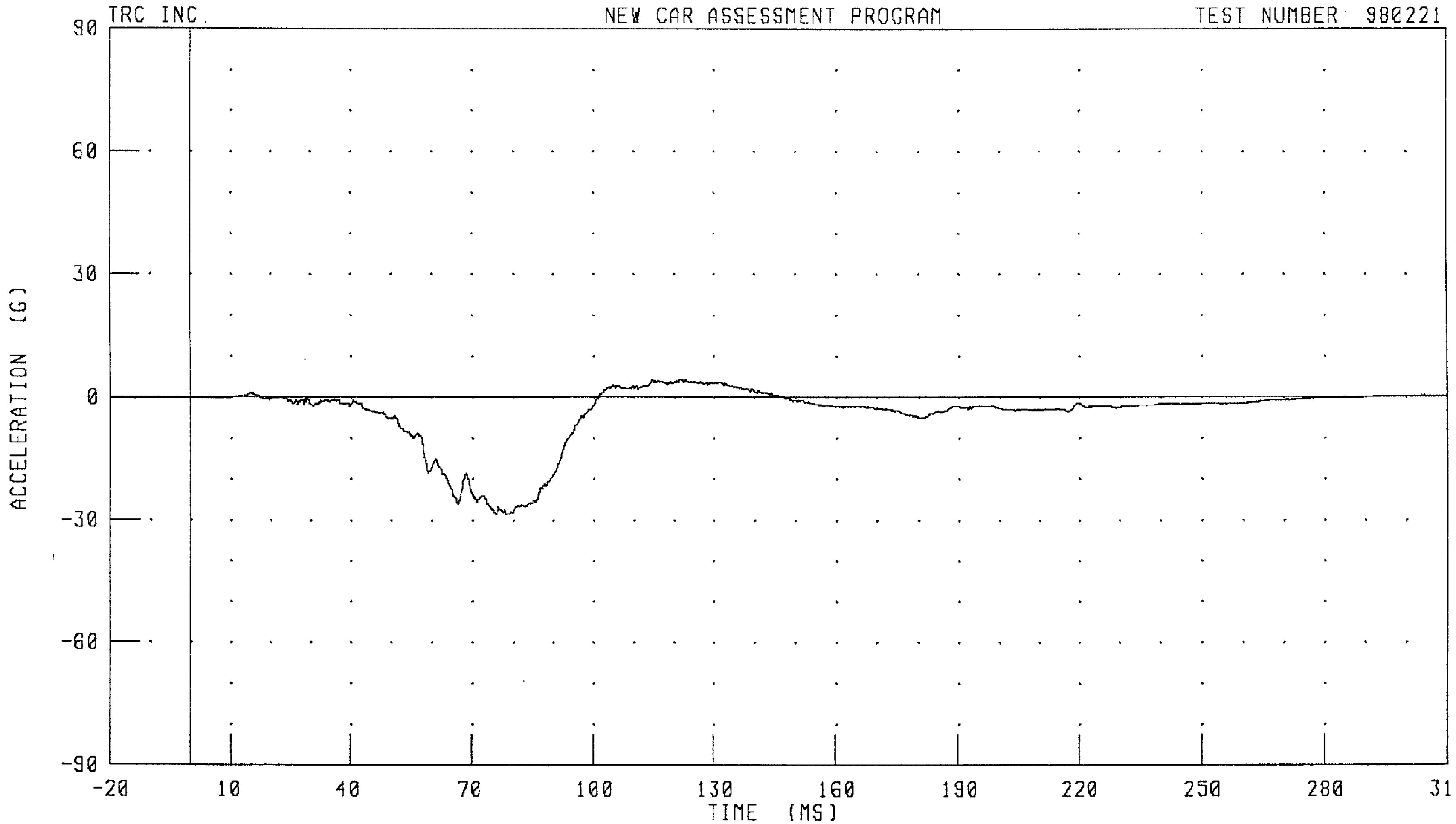
CHANNEL: HEDXR1 FILTER: CH. CLASS 1000 PEAK DATA: 18.61 G @ 183.44 MS; -52.11 G @ 81.04 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM



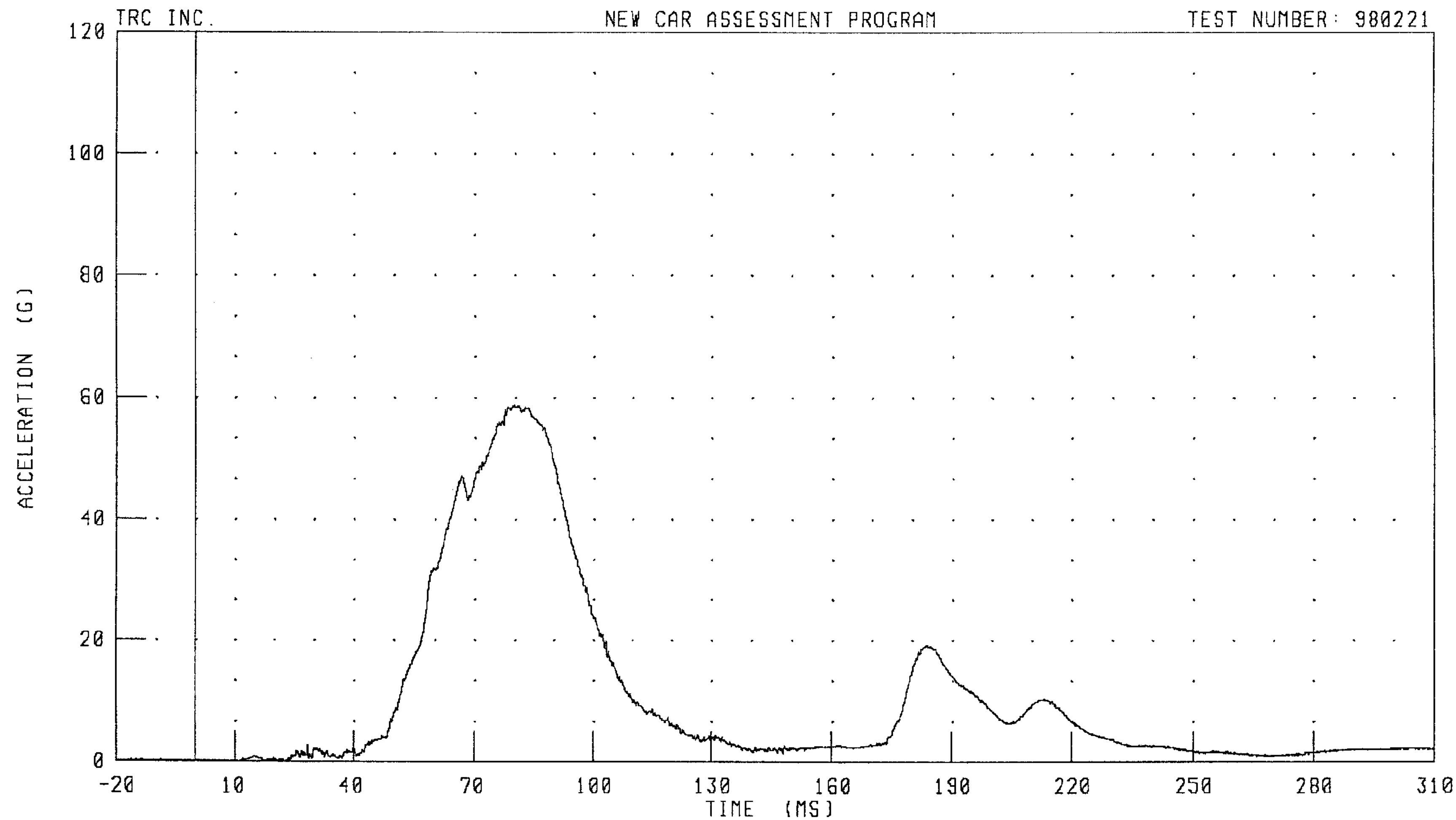
CHANNEL: HEDYR1 FILTER: CH. CLASS 1000 PEAK DATA: 5.74 G @ 87.84 MS; -3.15 G @ 180.72 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM



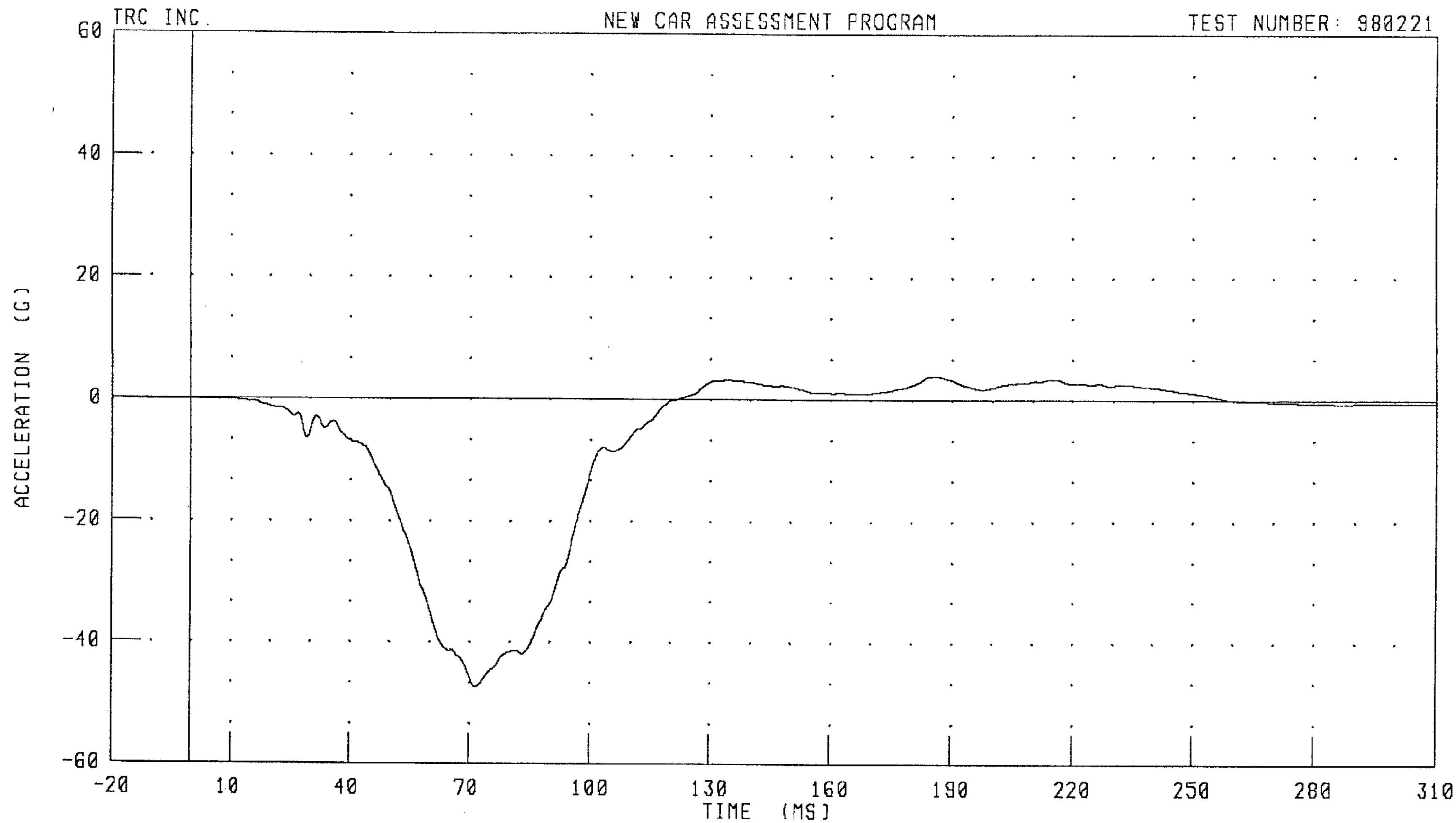
CHANNEL: HEDZR1 FILTER: CH. CLASS 1000 PEAK DATA: 4.29 G @ 114.64 MS; -28.71 G @ 75.92 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM



CHANNEL: HEDRR1 FILTER: CH. CLASS 1000 PEAK DATA: 58.76 G @ 79.84 MS; 0.10 G @ -19.20 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

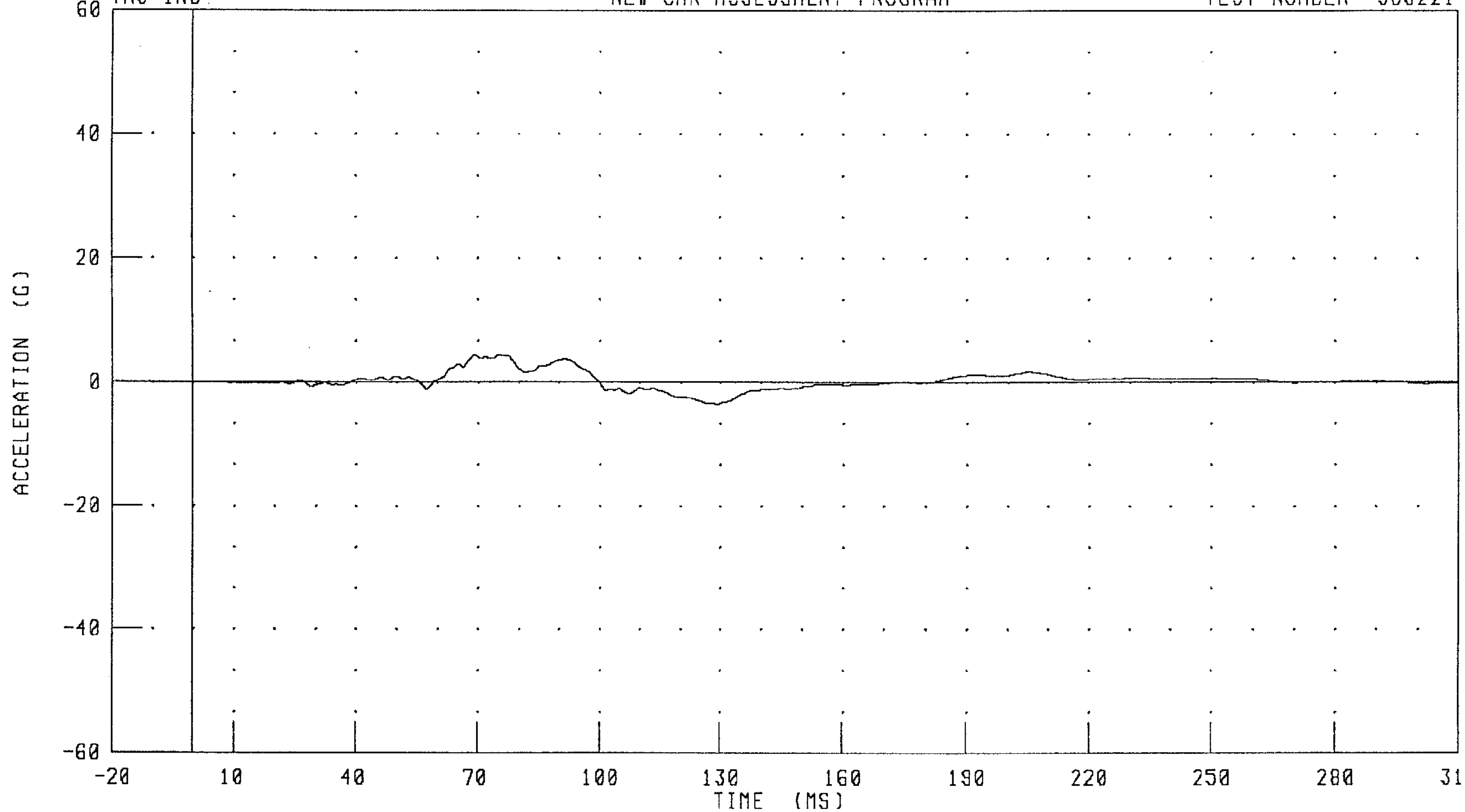


CHANNEL: CSTXR1   FILTER: CH. CLASS 180   PEAK DATA: 3.97 G @ 185.04 MS; -47.38 G @ 71.60 MS

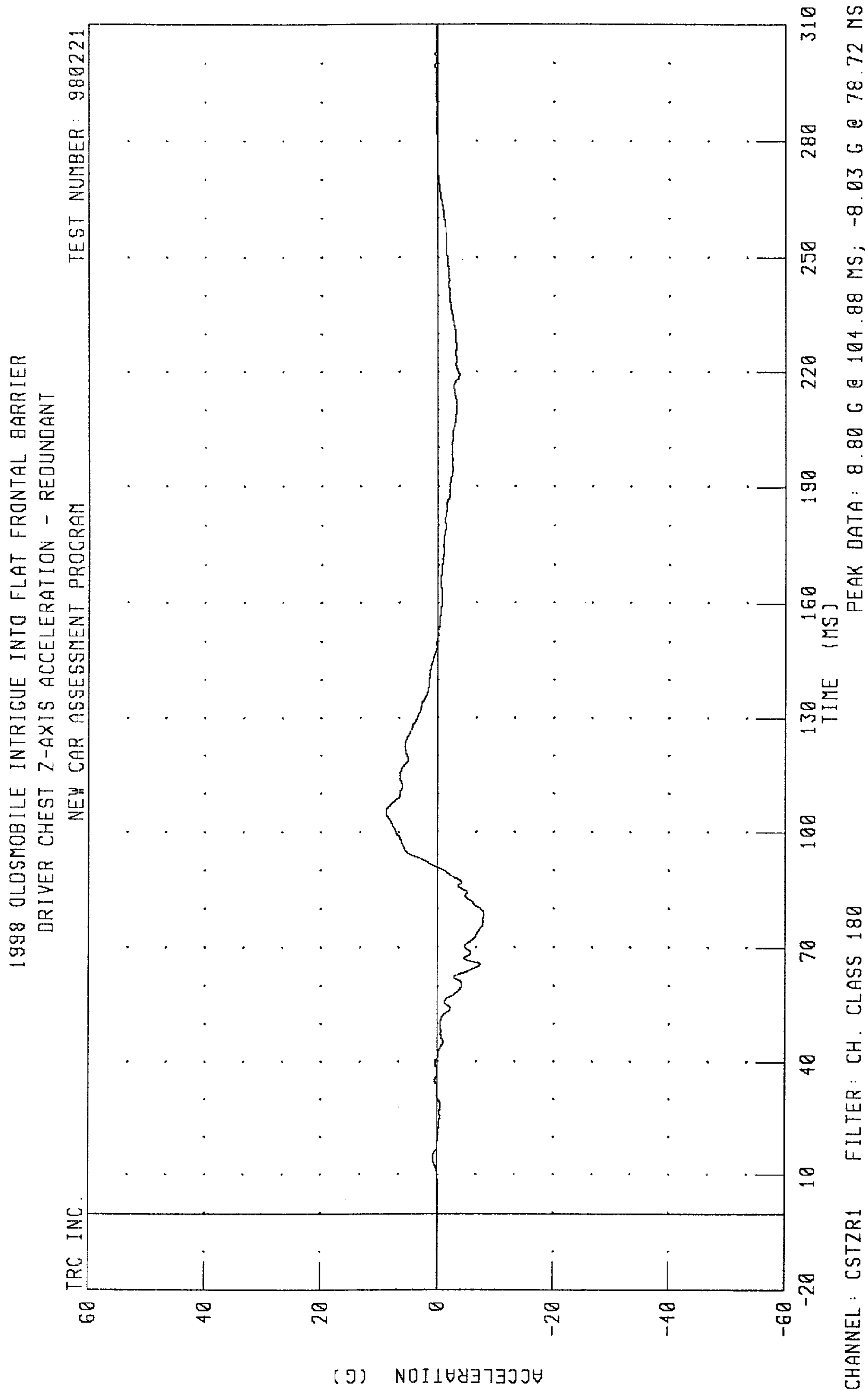
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TRC INC.

TEST NUMBER: 980221

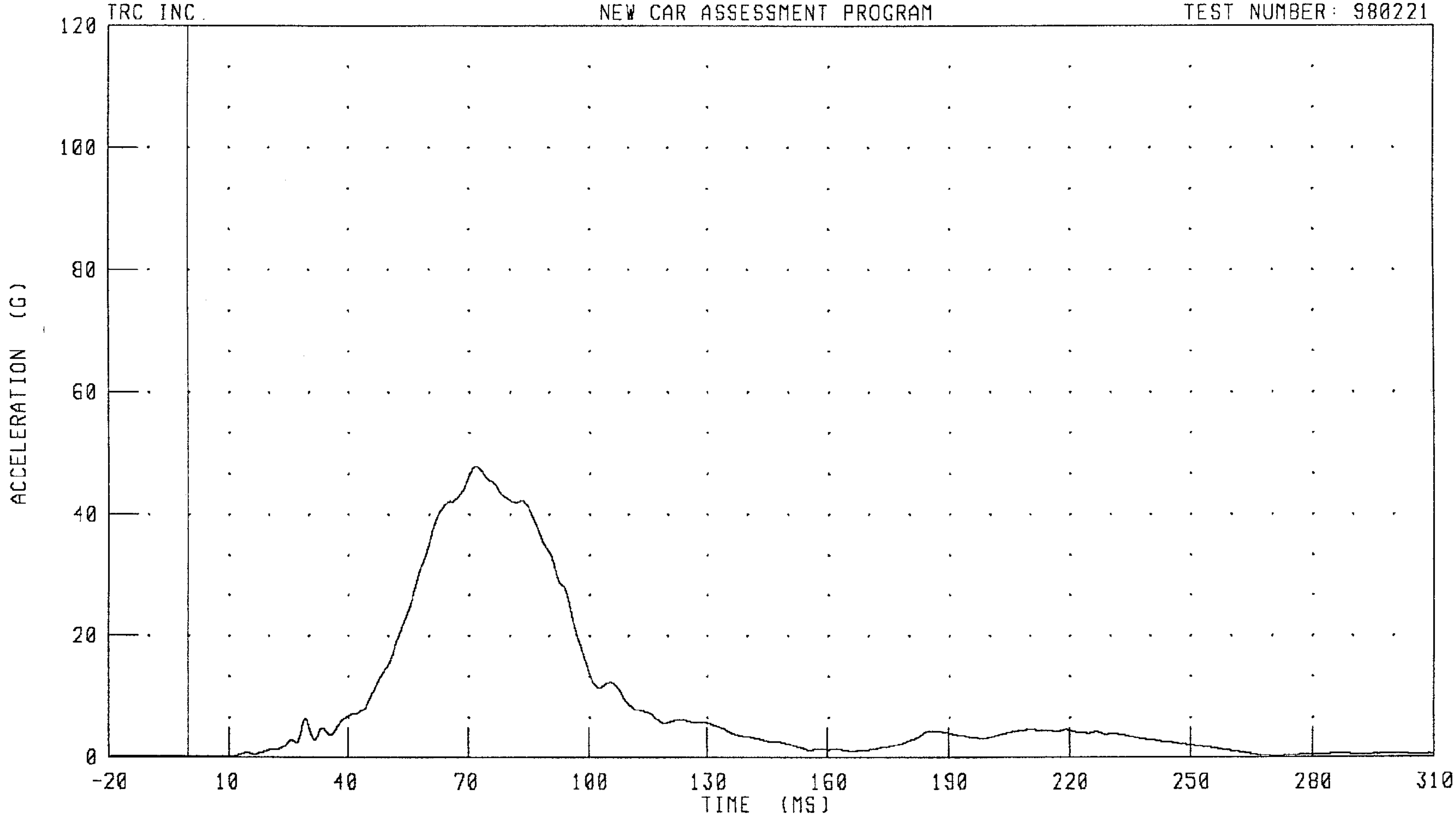


CHANNEL: CSTYR1 FILTER: CH. CLASS 180 PEAK DATA: 4.49 G @ 75.12 MS; -3.54 G @ 129.20 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZR1
FILTER: CH. CLASS 180
PEAK DATA: 8.80 G @ 104.88 MS; -8.03 G @ 78.72 MS

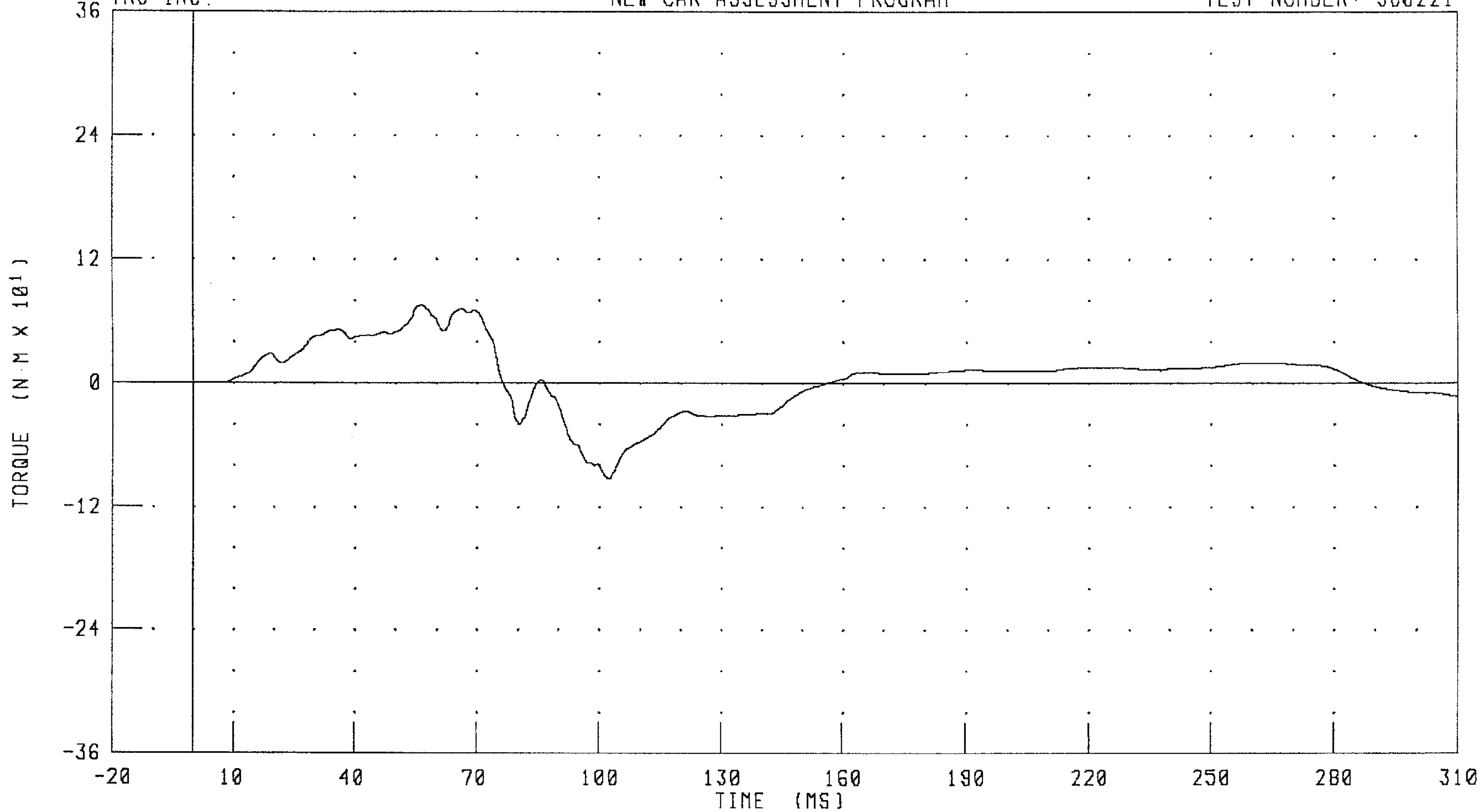
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221



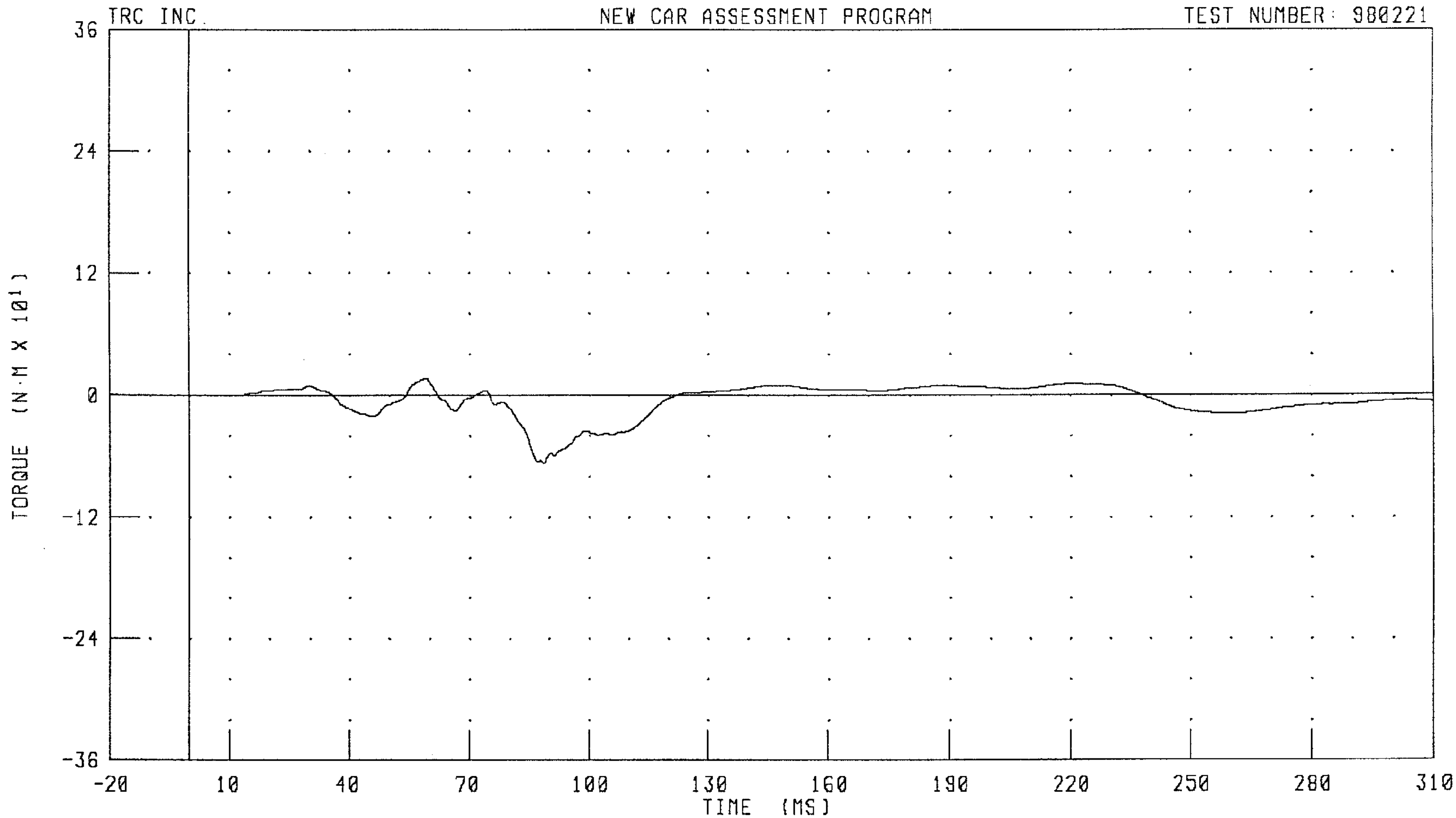
CHANNEL: CSTRR1 FILTER: CH. CLASS 180 PEAK DATA: 47.88 G @ 71.68 MS; 0.02 G @ -20.00 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT X AXIS
TRC INC. NEW CAR ASSESSMENT PROGRAM TEST NUMBER: 980221



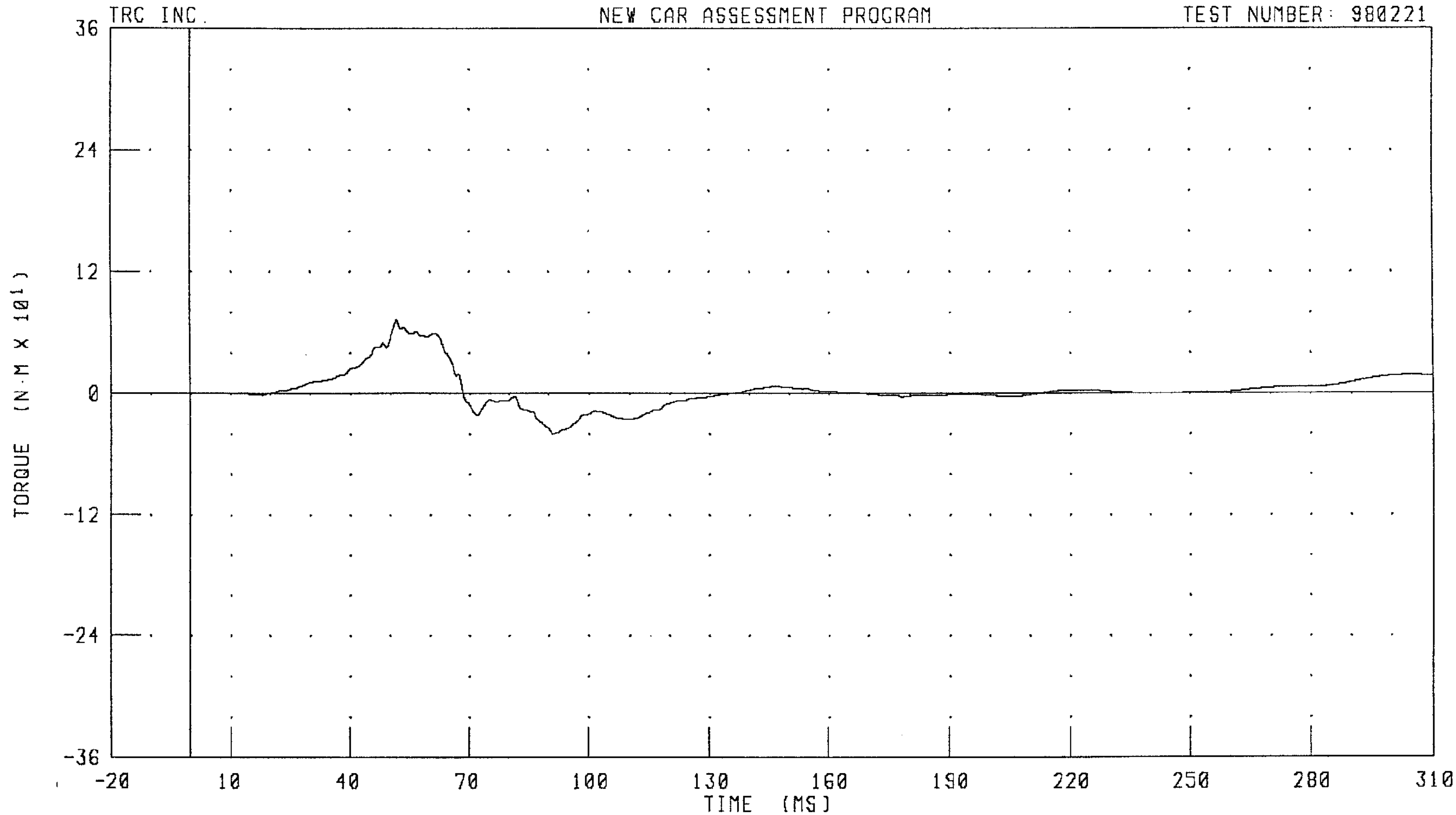
CHANNEL: TBLXM1 FILTER: CH. CLASS 600 PEAK DATA: 75.62 N·M @ 56.56 MS; -92.80 N·M @ 102.24 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM



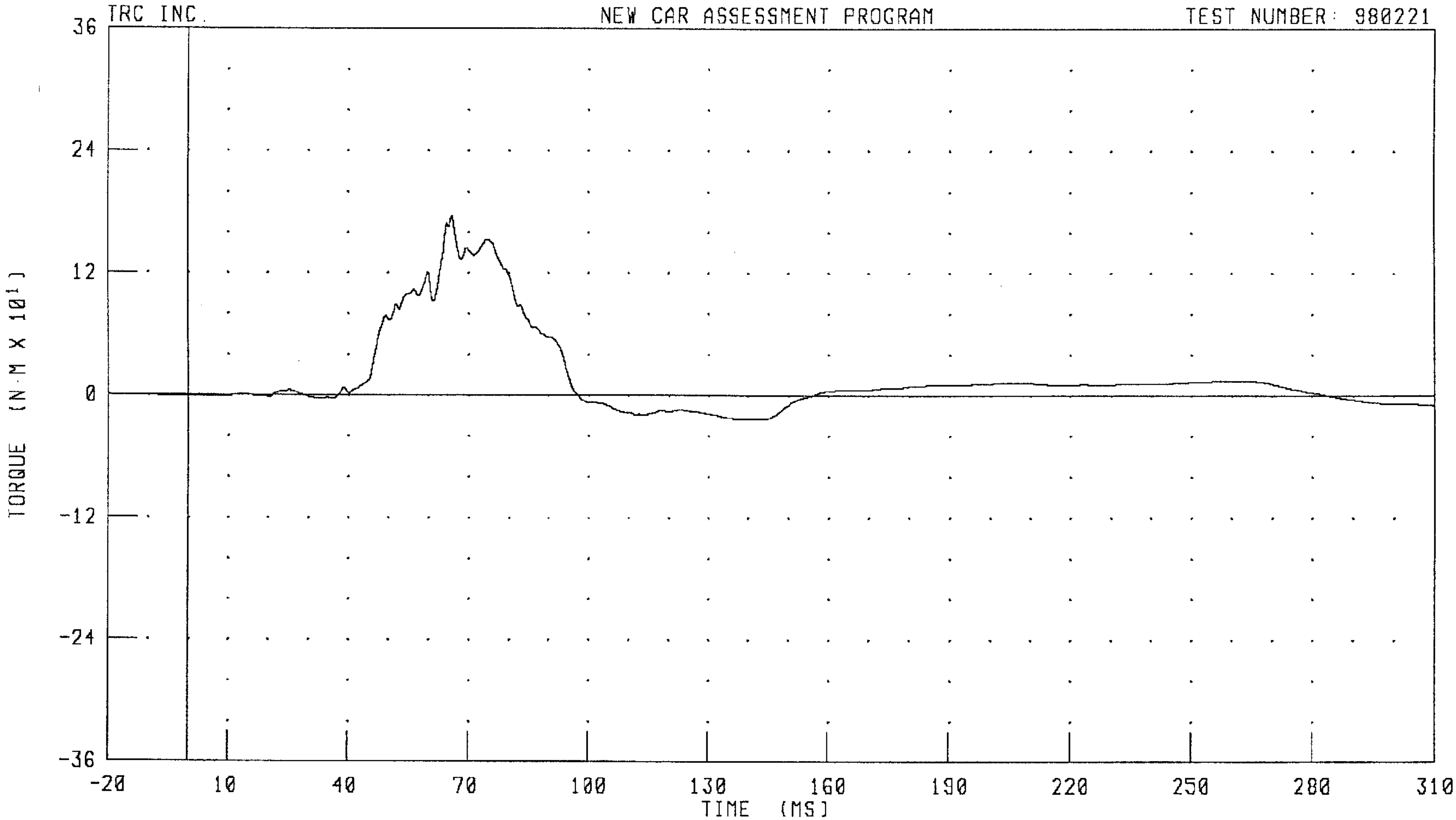
CHANNEL: TBLYM1 FILTER: CH. CLASS 600 PEAK DATA: 16.75 N·M @ 59.12 MS; -67.13 N·M @ 88.72 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS



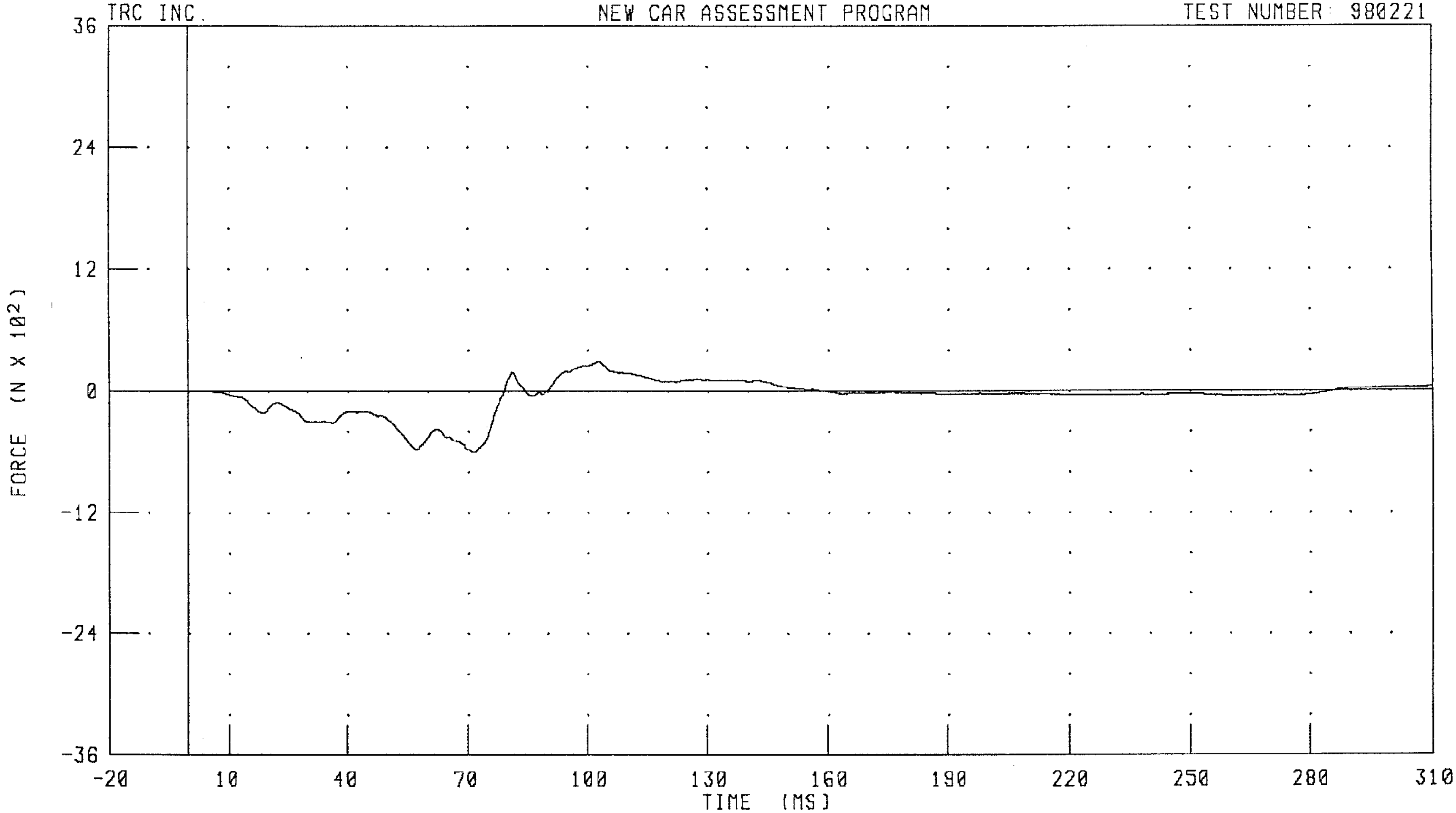
CHANNEL: TBRXM1 FILTER: CH. CLASS 600 PEAK DATA: 73.34 N·M @ 51.68 MS; -39.80 N·M @ 91.28 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM



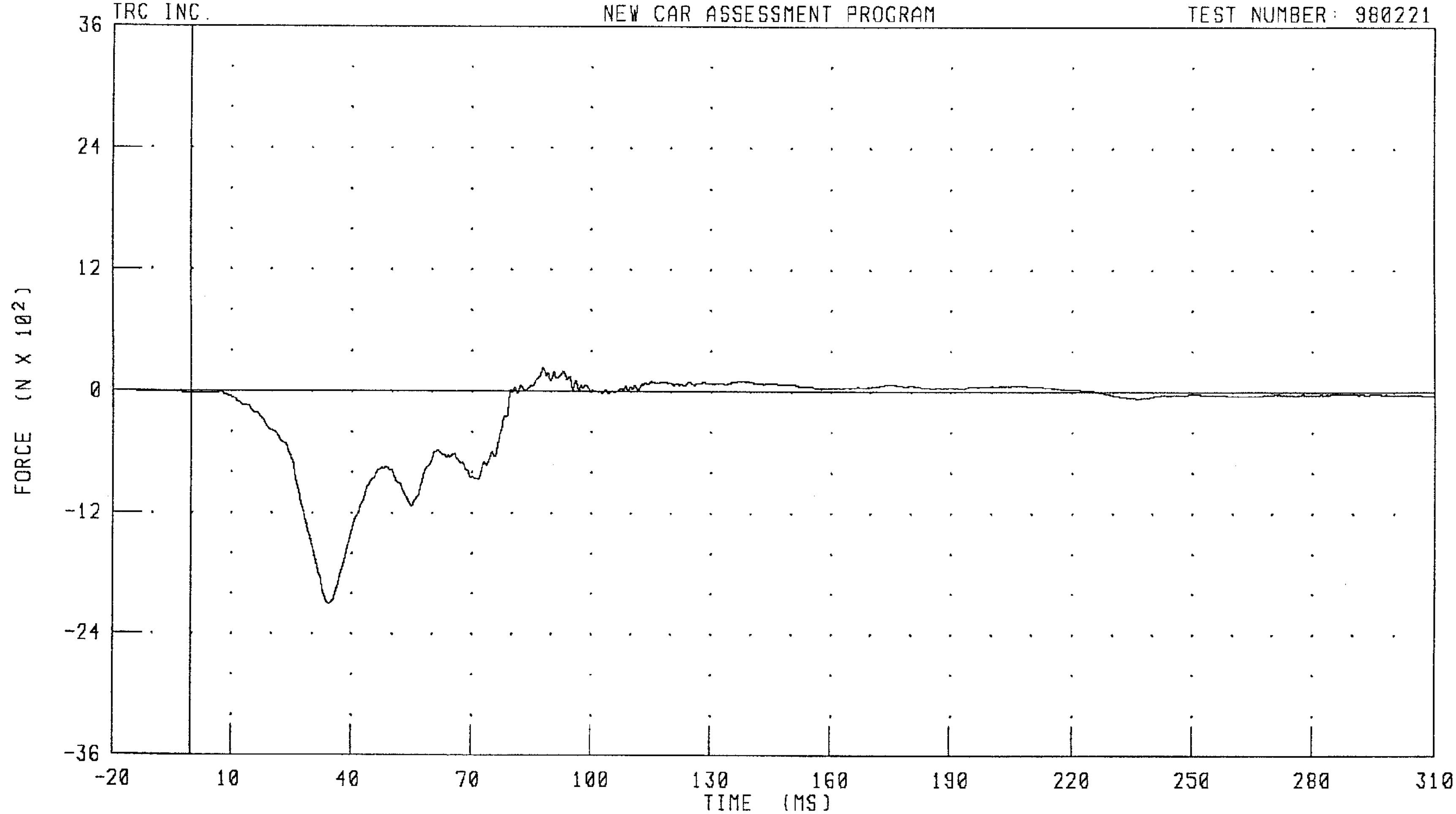
CHANNEL: TBRYM1 FILTER: CH. CLASS 600 PEAK DATA: 175.44 N·M @ 66.00 MS; -23.72 N·M @ 142.24 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT LOWER TIBIA X-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM



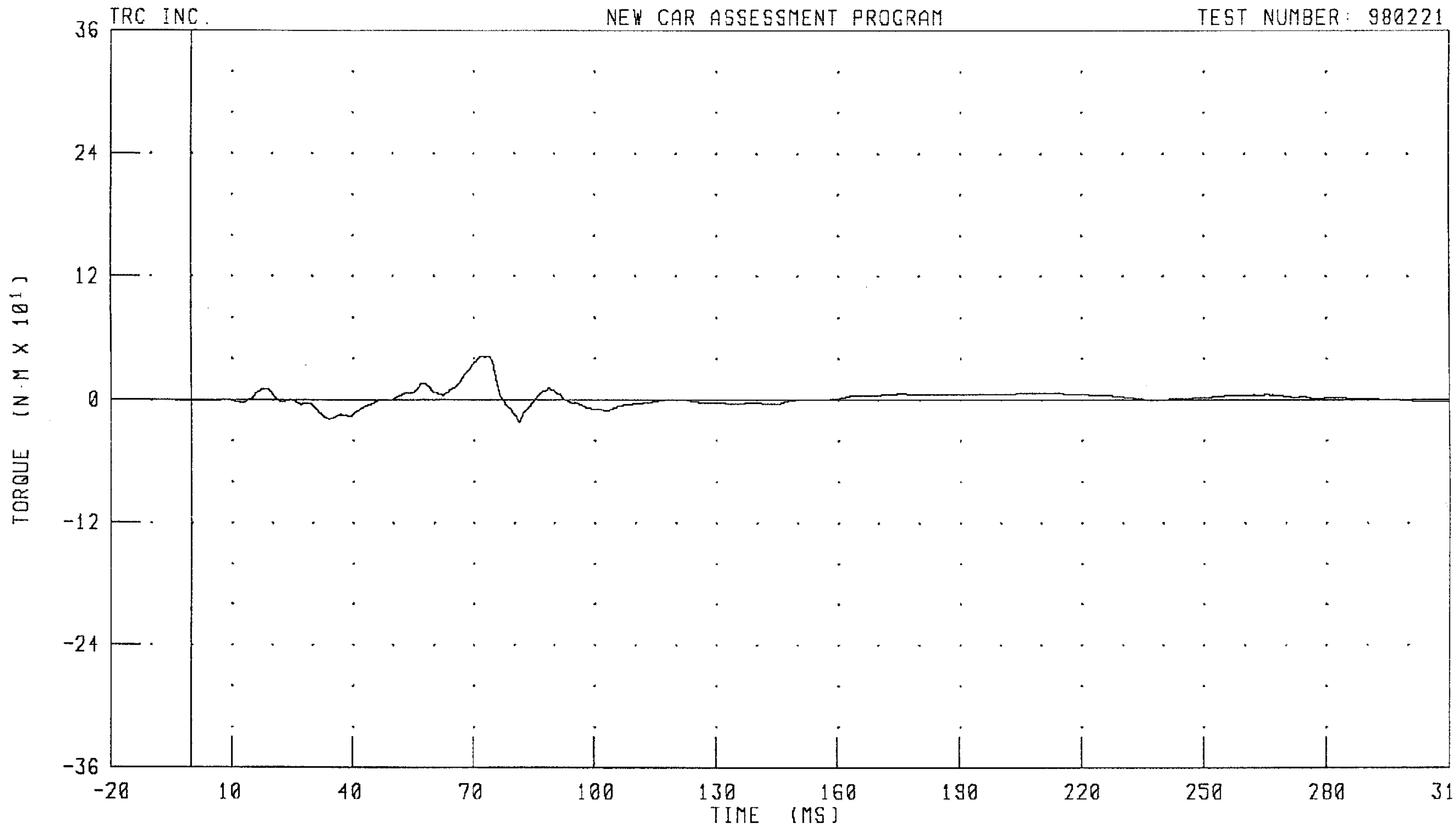
CHANNEL: ANLXF1 FILTER: CH. CLASS 600 PEAK DATA: 287.10 N @ 102.72 MS; -603.14 N @ 71.36 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT LOWER TIBIA Z-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM



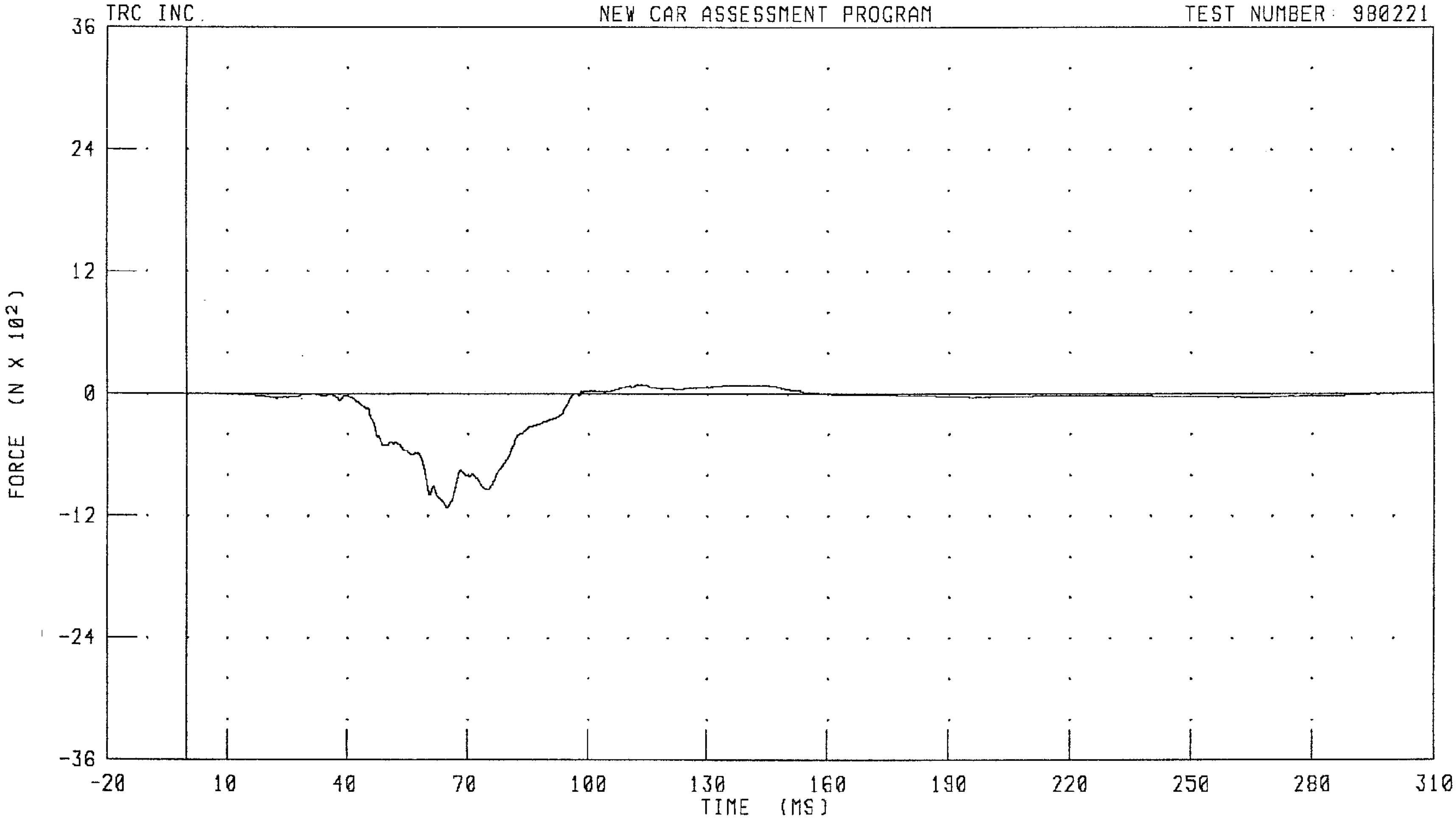
CHANNEL: ANLZF1   FILTER: CH. CLASS 600   PEAK DATA: 229.26 N @ 88.00 MS; -2099.18 N @ 34.48 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM



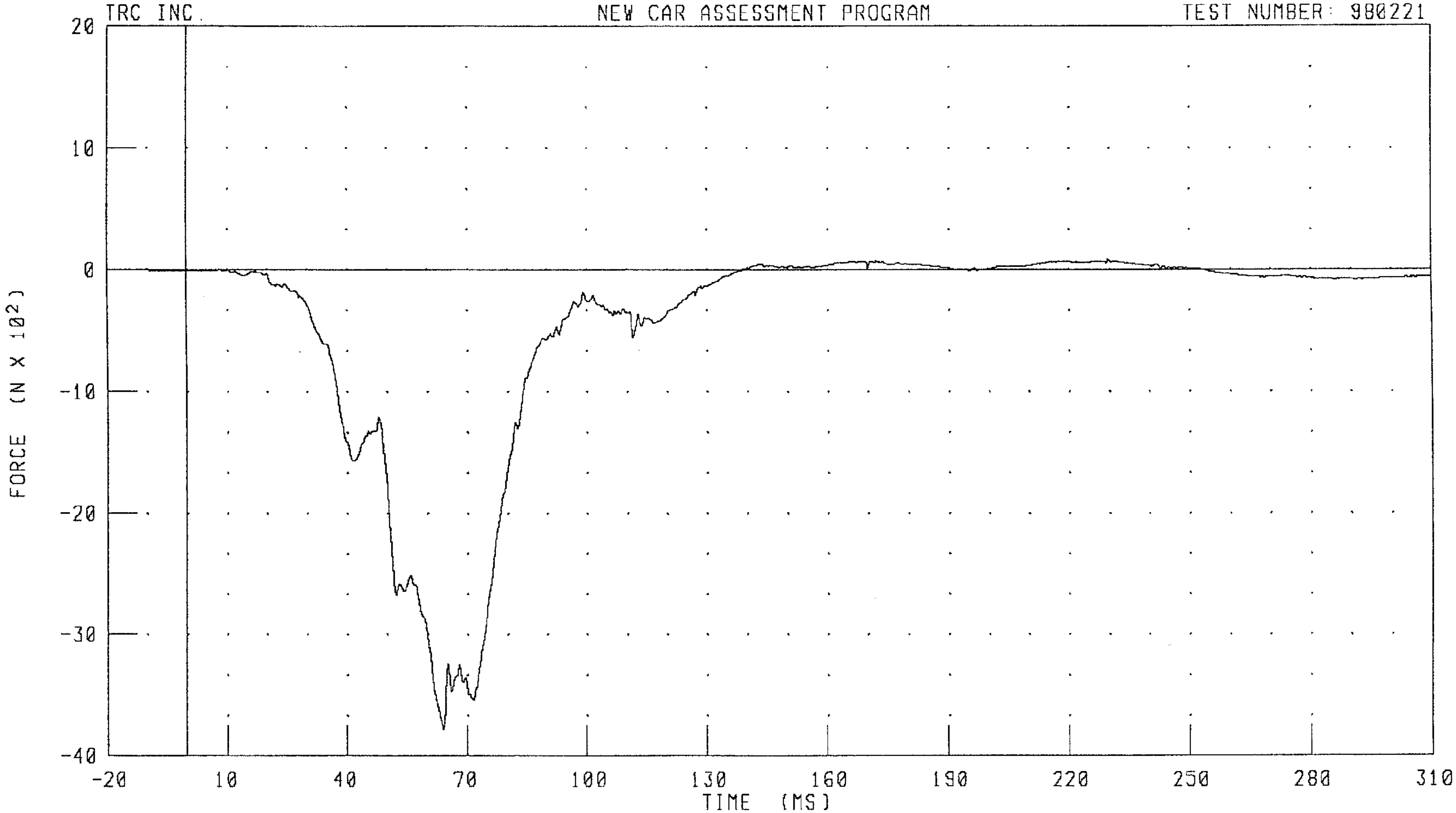
CHANNEL: ANLYM1 FILTER: CH. CLASS 600 PEAK DATA: 41.88 N·M @ 73.60 MS; -22.08 N·M @ 81.28 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT LOWER TIBIA X-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM



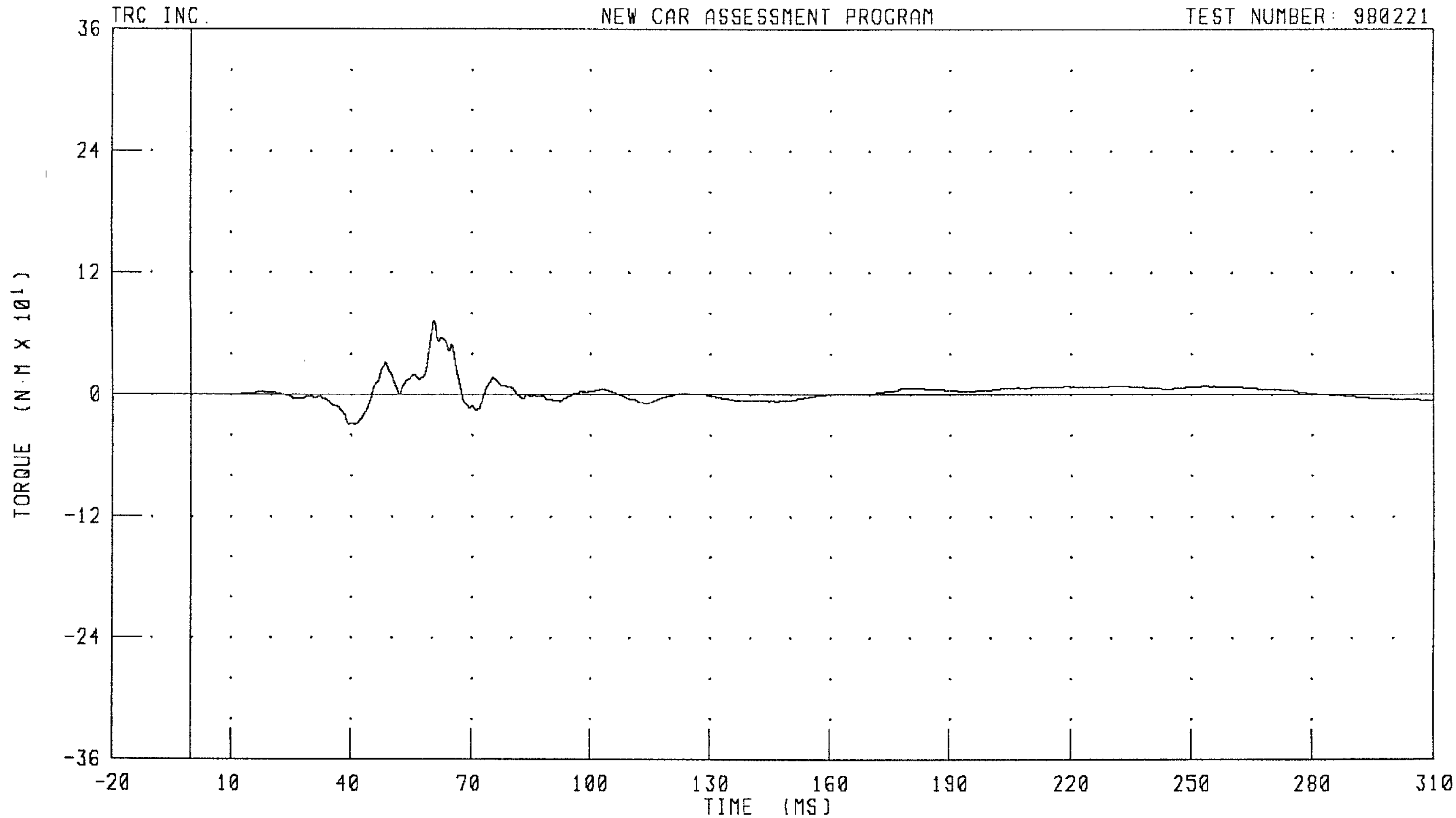
CHANNEL: ANRXF1 FILTER: CH. CLASS 600 PEAK DATA: 88.41 N @ 112.56 MS; -1117.60 N @ 64.88 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM



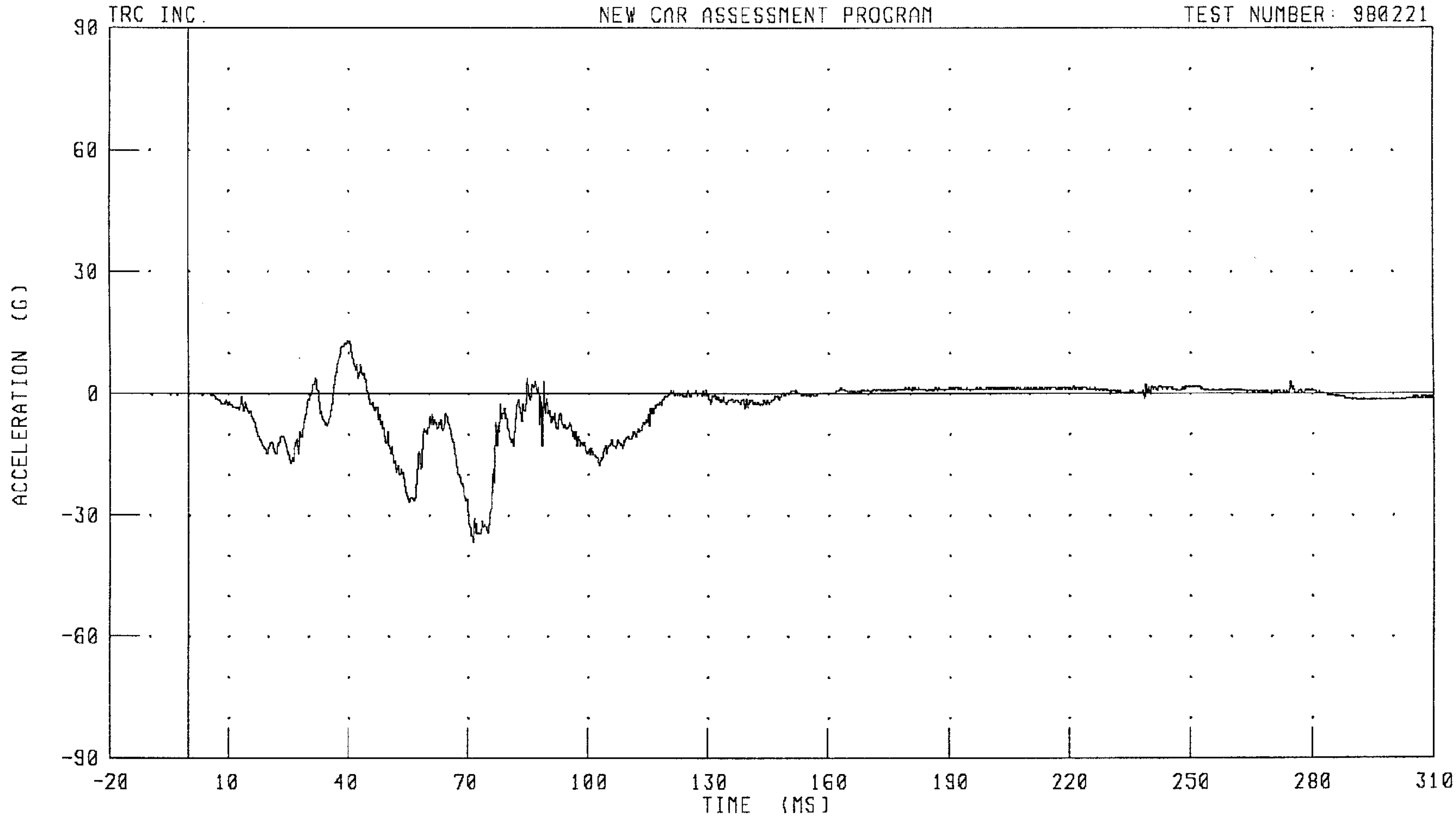
CHANNEL: ANRZF1 FILTER: CH. CLASS 600 PEAK DATA: 82.38 N @ 229.92 MS; -3783.03 N @ 64.08 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS



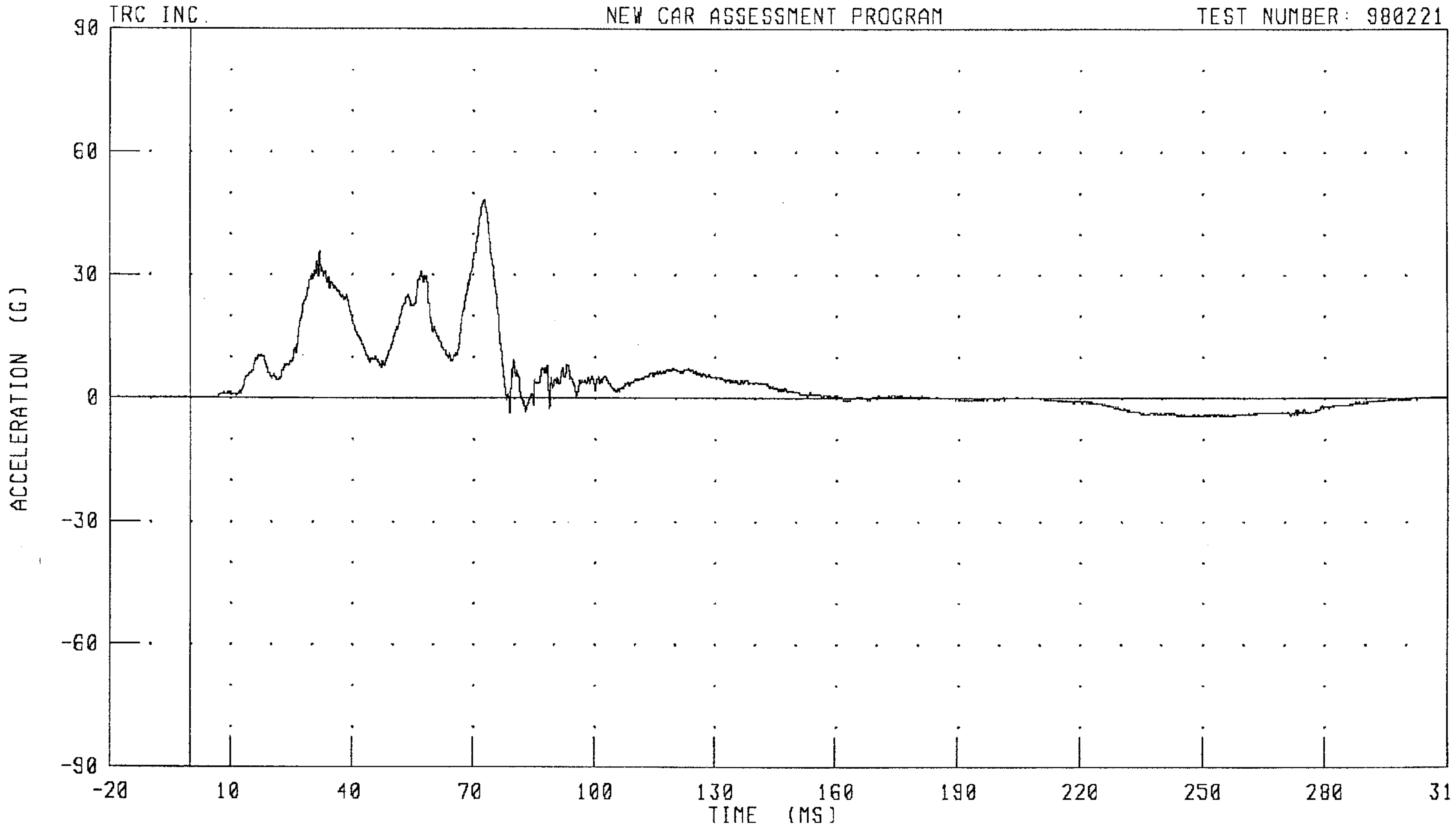
CHANNEL: ANRYM1 FILTER: CH. CLASS 600 PEAK DATA: 72.71 N·M @ 60.72 MS; -29.56 N·M @ 39.52 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT FOOT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



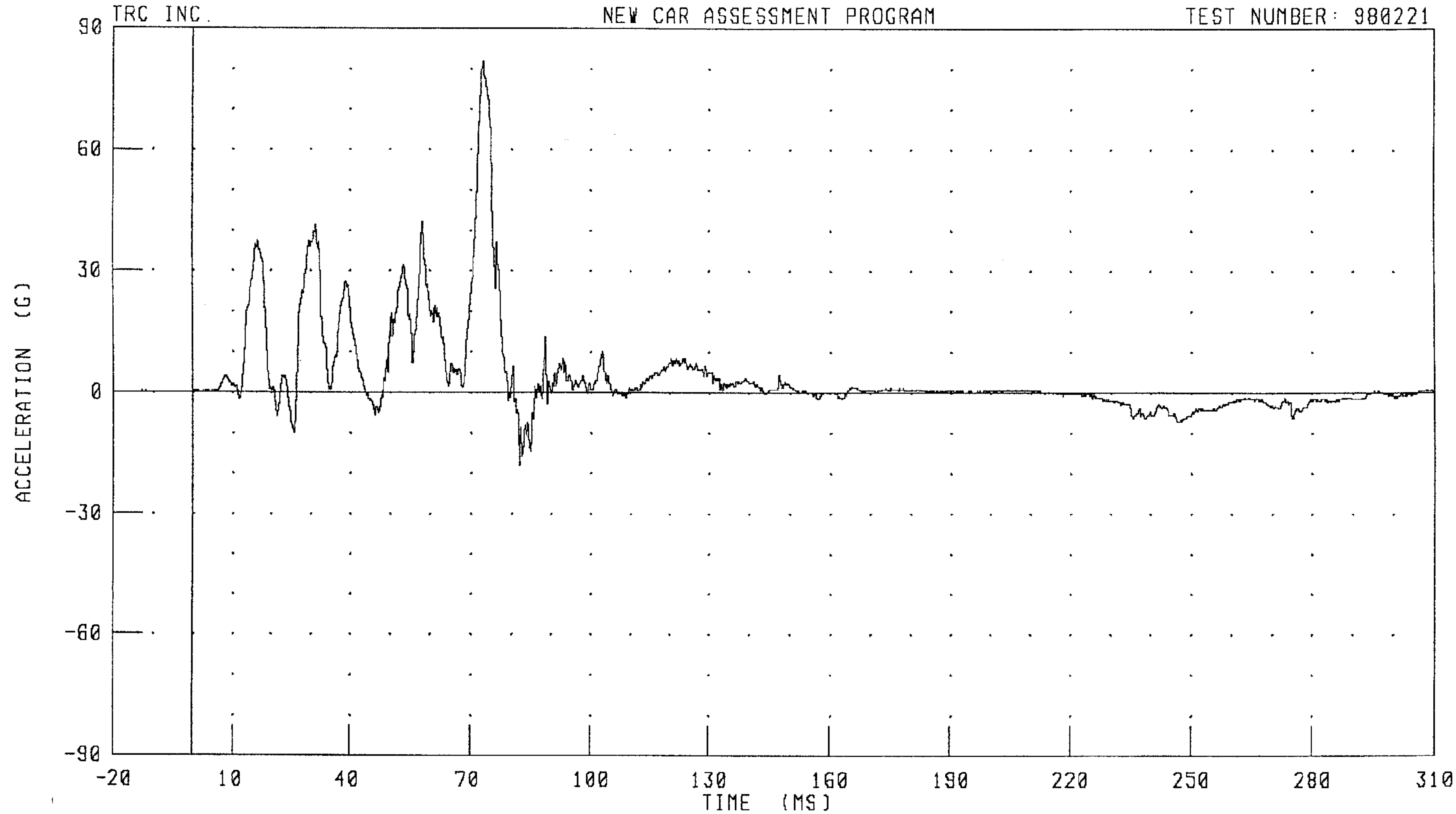
CHANNEL: FTLXG1 FILTER: CH. CLASS 1000 PEAK DATA: 12.89 G @ 39.76 MS; -36.58 G @ 71.28 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT FOOT Z-AXIS ACCELERATION AT HEEL
NEW CAR ASSESSMENT PROGRAM

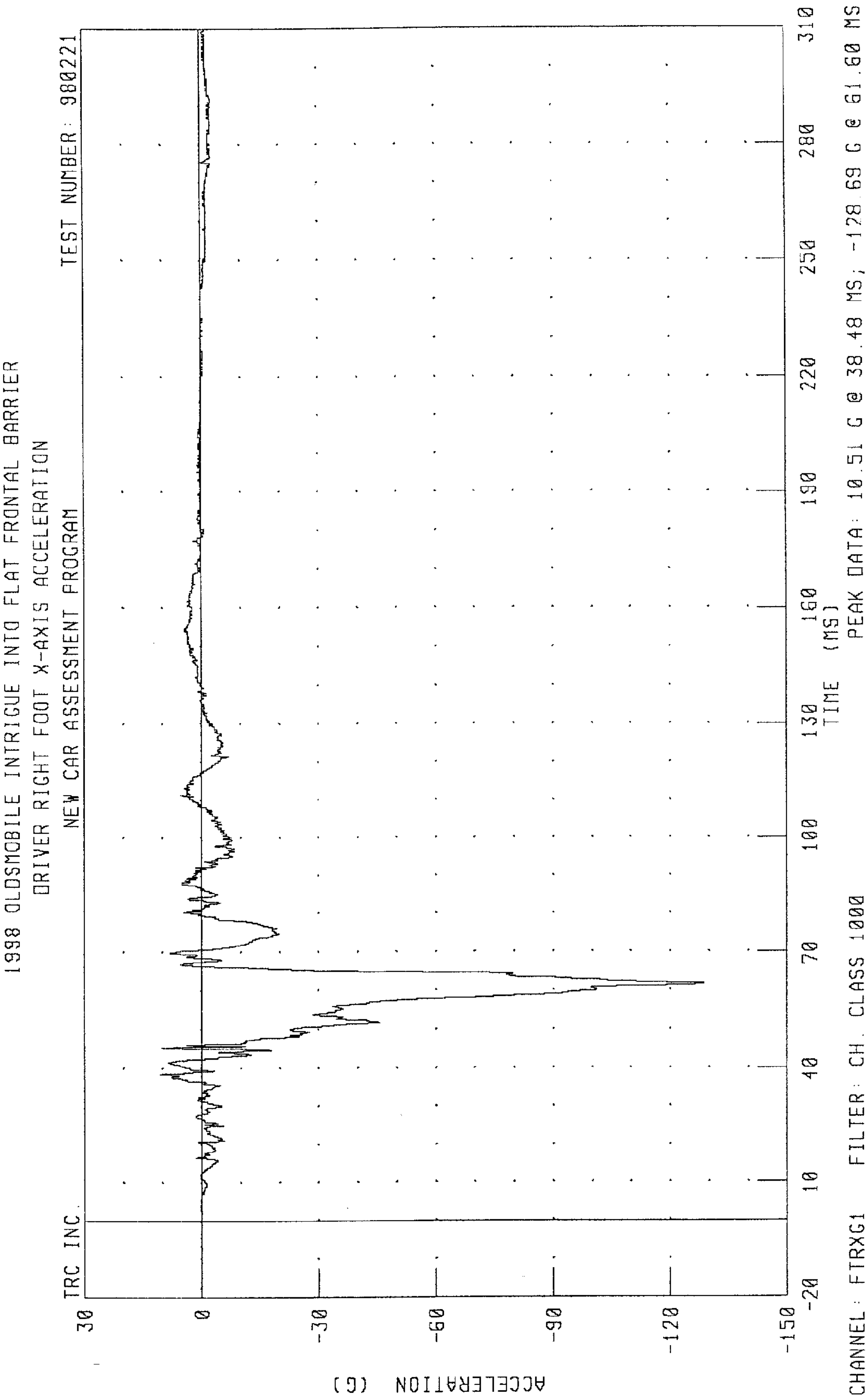


CHANNEL: FTLZH1 FILTER: CH. CLASS 1000 PEAK DATA: 48.35 G @ 72.88 MS; -4.42 G @ 243.84 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LEFT FOOT Z-AXIS ACCELERATION AT TOE
NEW CAR ASSESSMENT PROGRAM

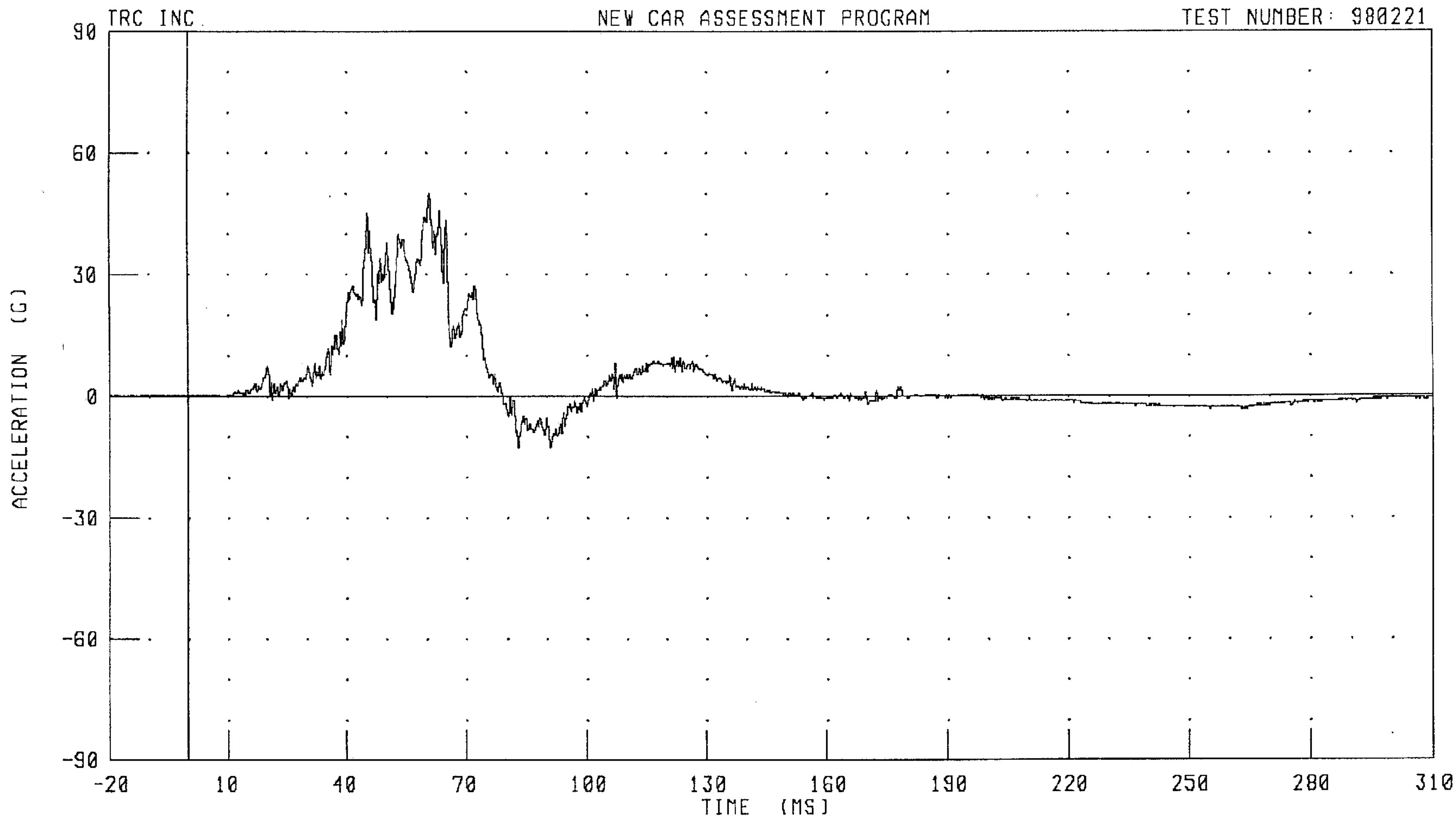


CHANNEL: FTLZT1 FILTER: CH. CLASS 1000 PEAK DATA: 81.79 G @ 73.04 MS; -18.05 G @ 82.16 MS



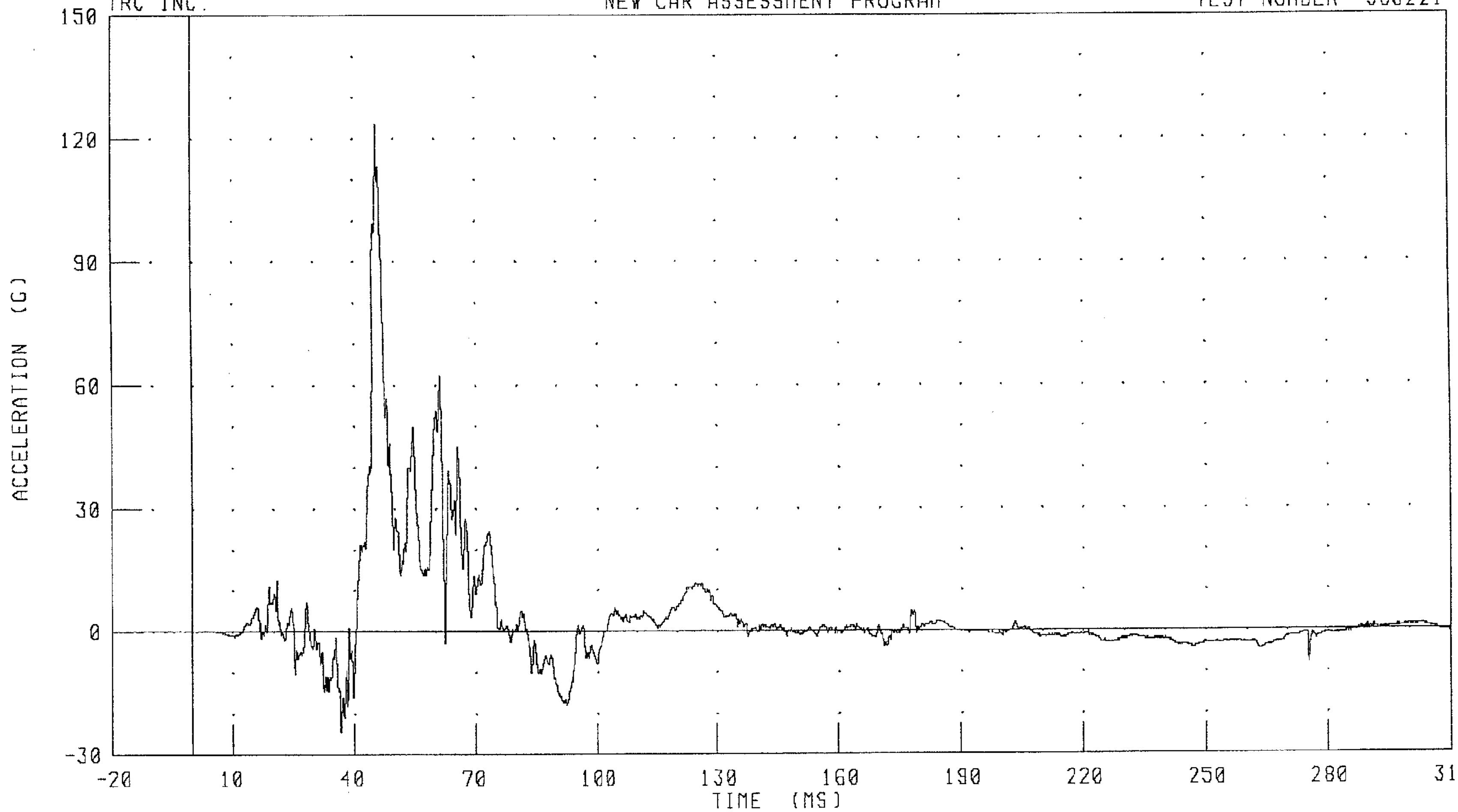
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FOOT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TEST NUMBER: 980221
TRC INC
ACCELERATION (G)
30
0
-30
-60
-90
-120
-150
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTRXG1
FILTER: CH. CLASS 1000
PEAK DATA: 10.51 G @ 38.48 MS; -128.69 G @ 61.60 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FOOT Z-AXIS ACCELERATION AT HEEL
NEW CAR ASSESSMENT PROGRAM



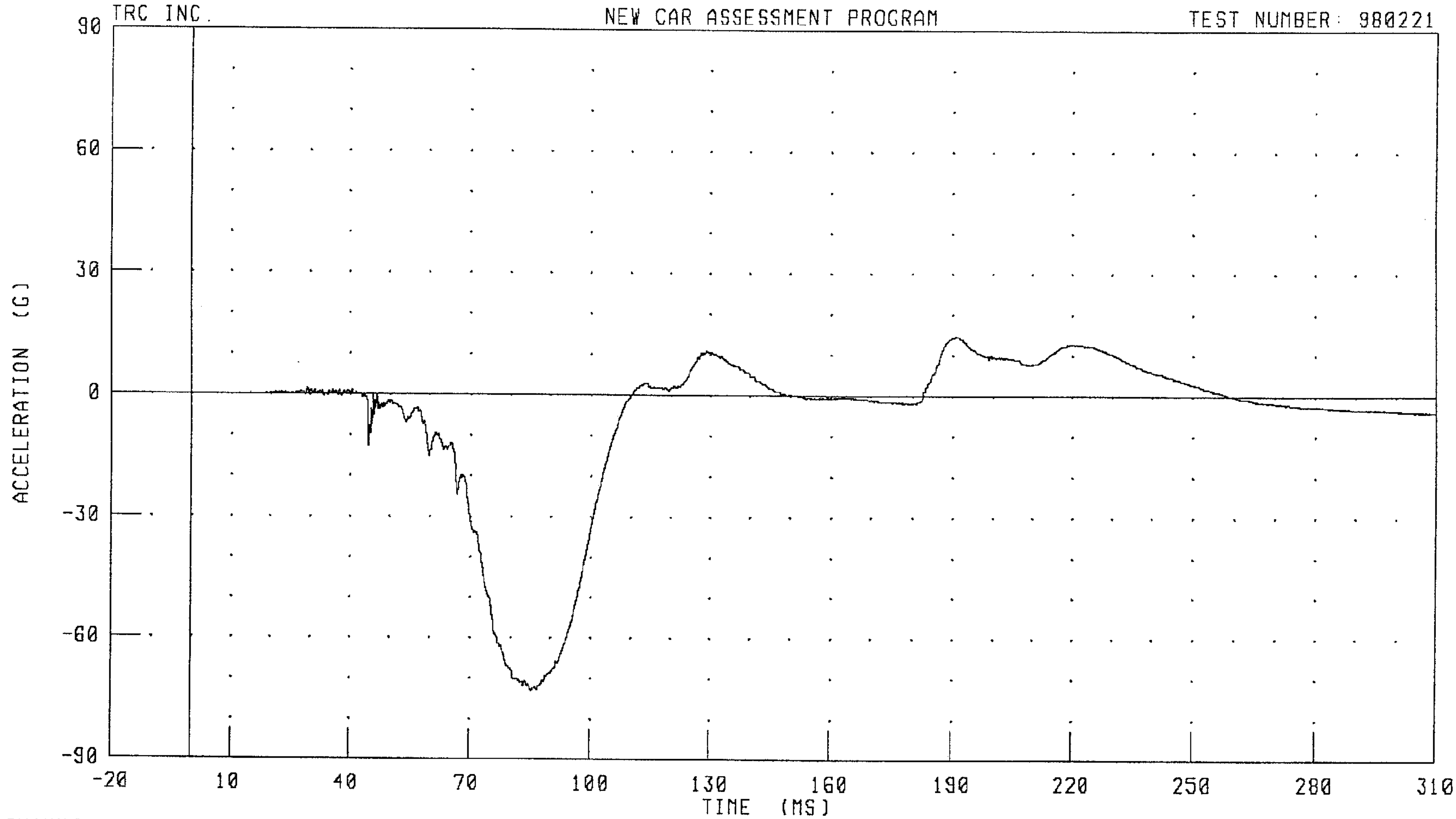
CHANNEL: FTRZH1 FILTER: CH. CLASS 1000 PEAK DATA: 50.06 G @ 60.80 MS; -12.75 G @ 82.72 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FOOT Z-AXIS ACCELERATION AT TOE
NEW CAR ASSESSMENT PROGRAM



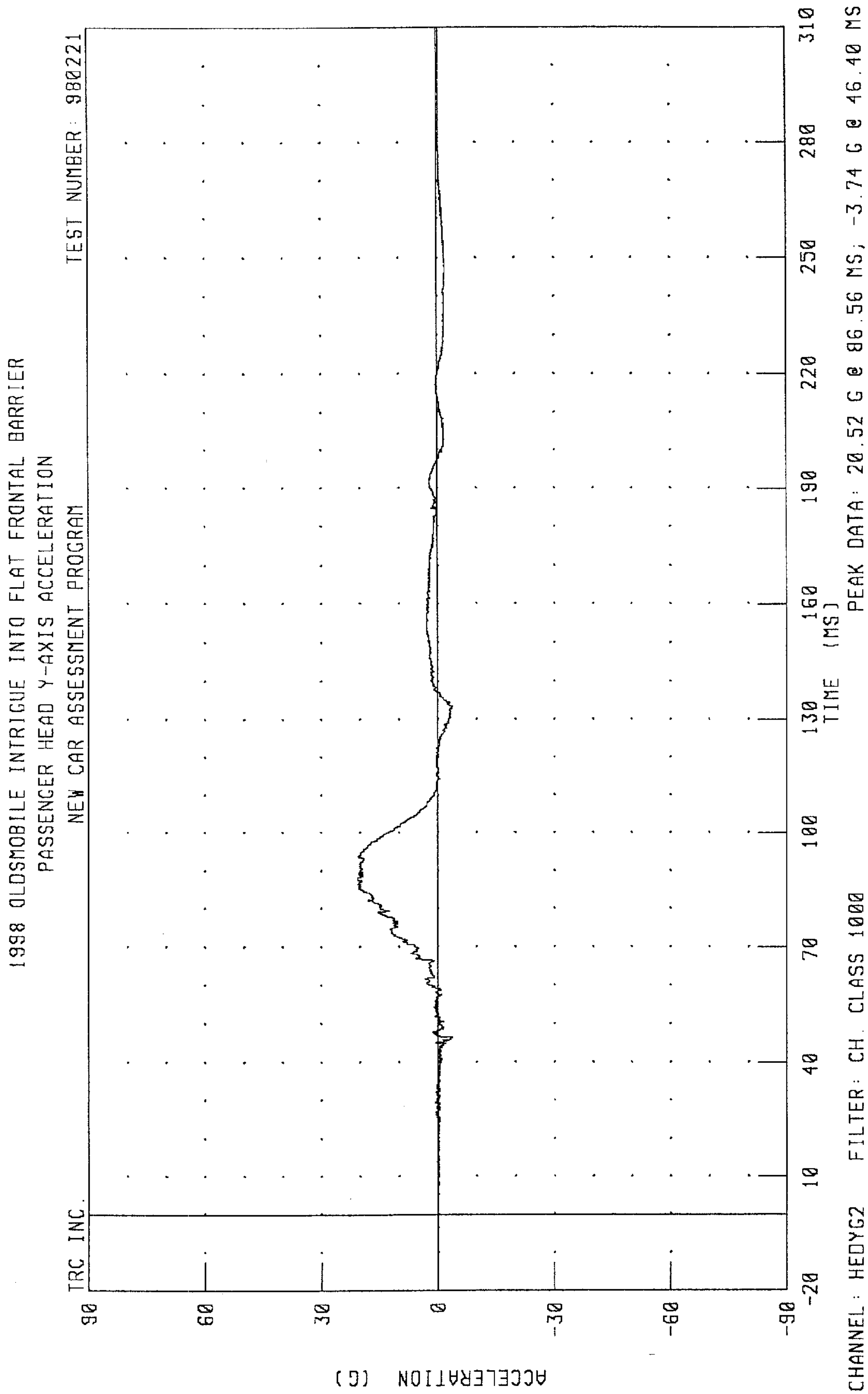
CHANNEL: FTRZT1 FILTER: CH. CLASS 1000 PEAK DATA: 123.63 G @ 45.68 MS; -24.49 G @ 36.80 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

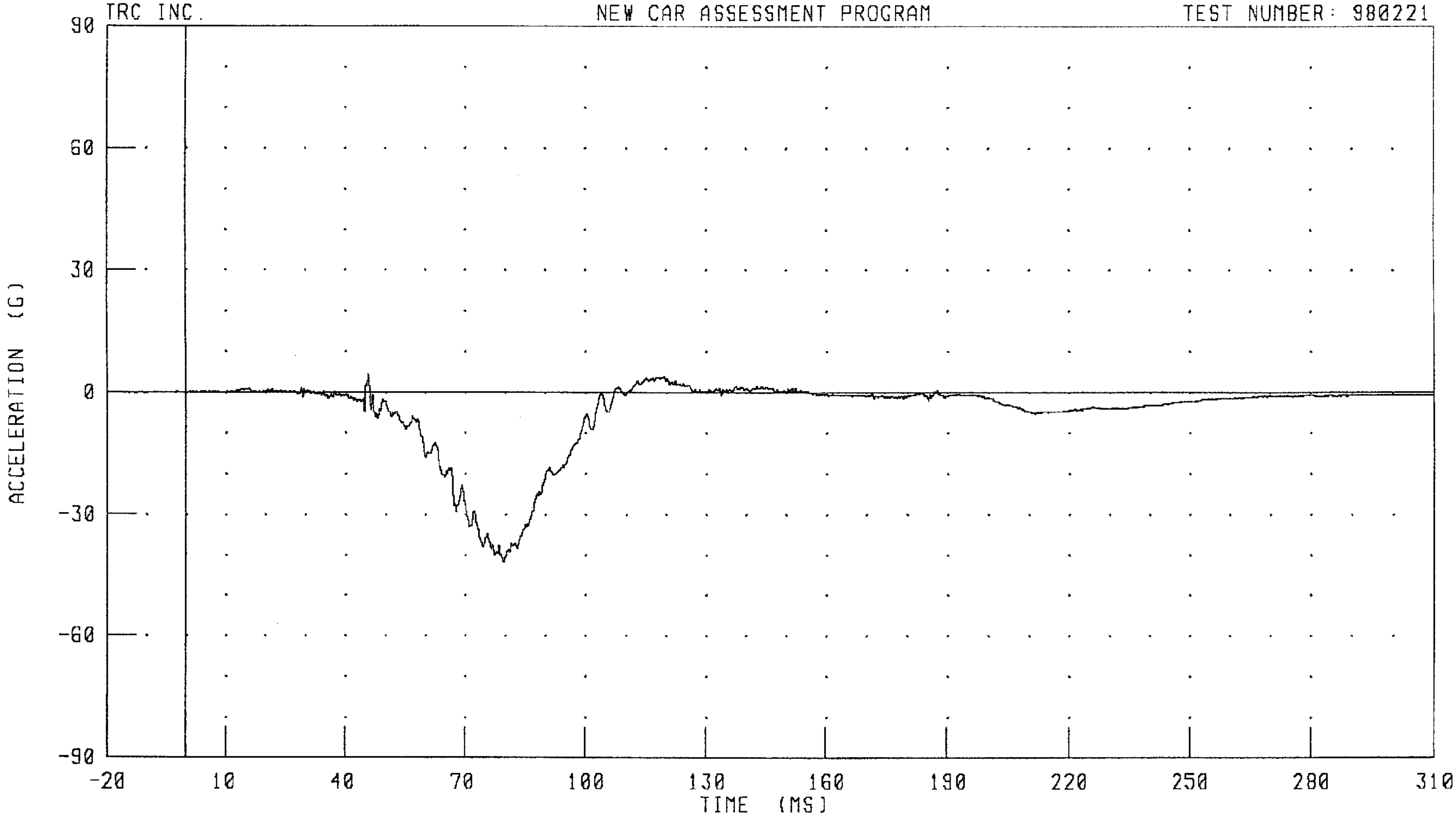


CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

PEAK DATA: 14.68 G @ 190.80 MS; -73.14 G @ 85.52 MS

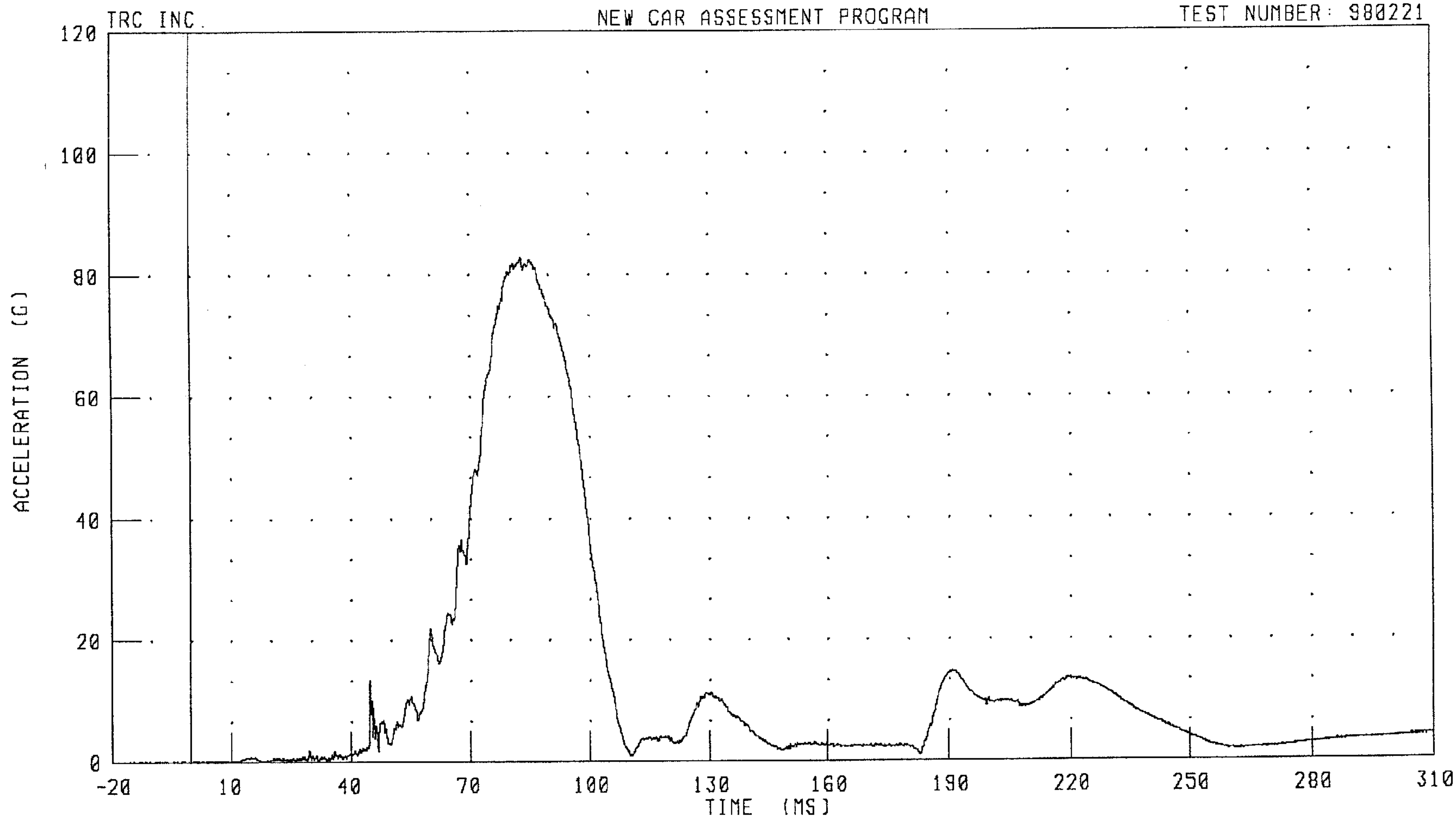

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG2
FILTER: CH. CLASS 1000
PEAK DATA: 20.52 G @ 86.56 MS; -3.74 G @ 46.40 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



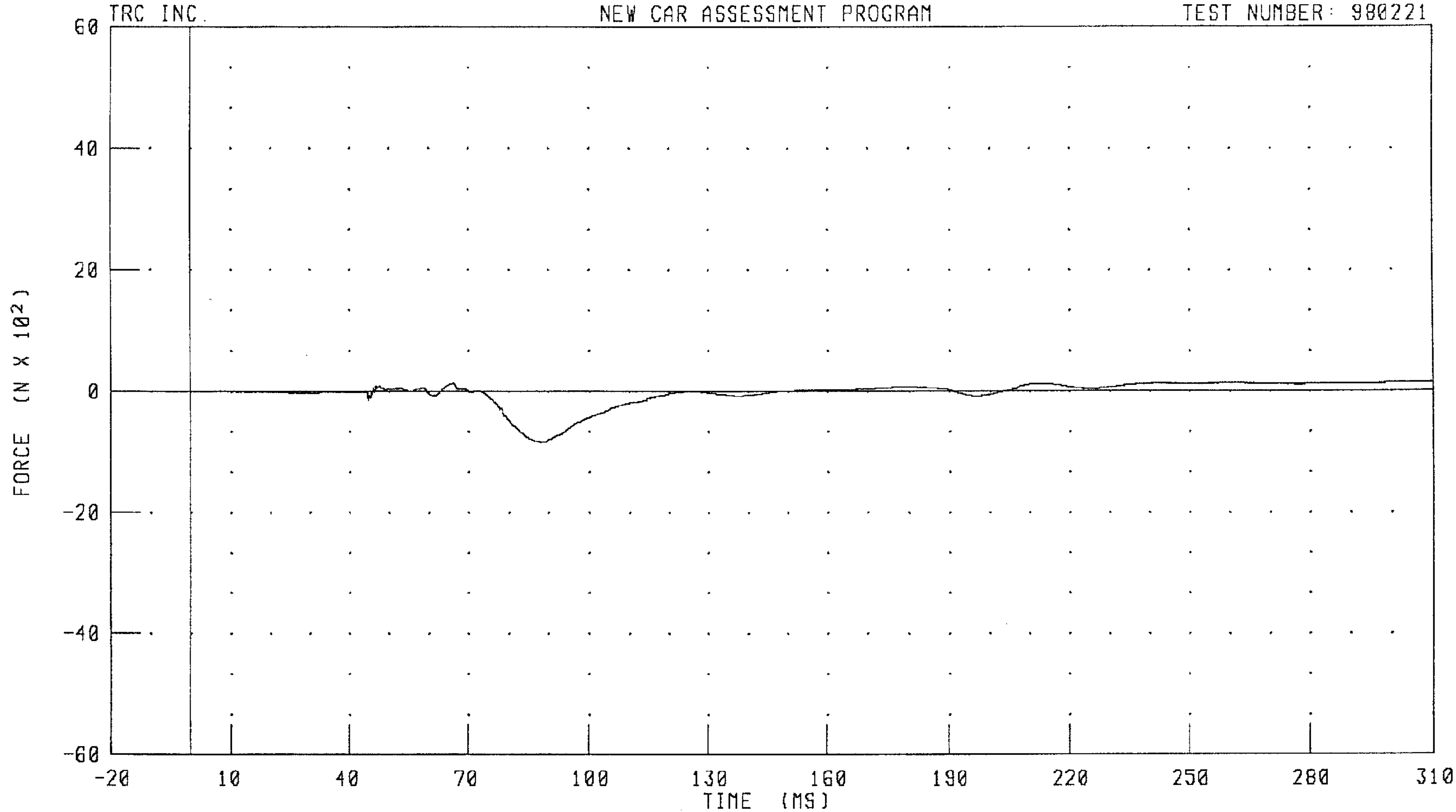
CHANNEL: HEDZG2 FILTER: CH. CLASS 1000 PEAK DATA: 4.65 G @ 45.60 MS; -41.69 G @ 79.68 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION
NEW CAR ASSESSMENT PROGRAM



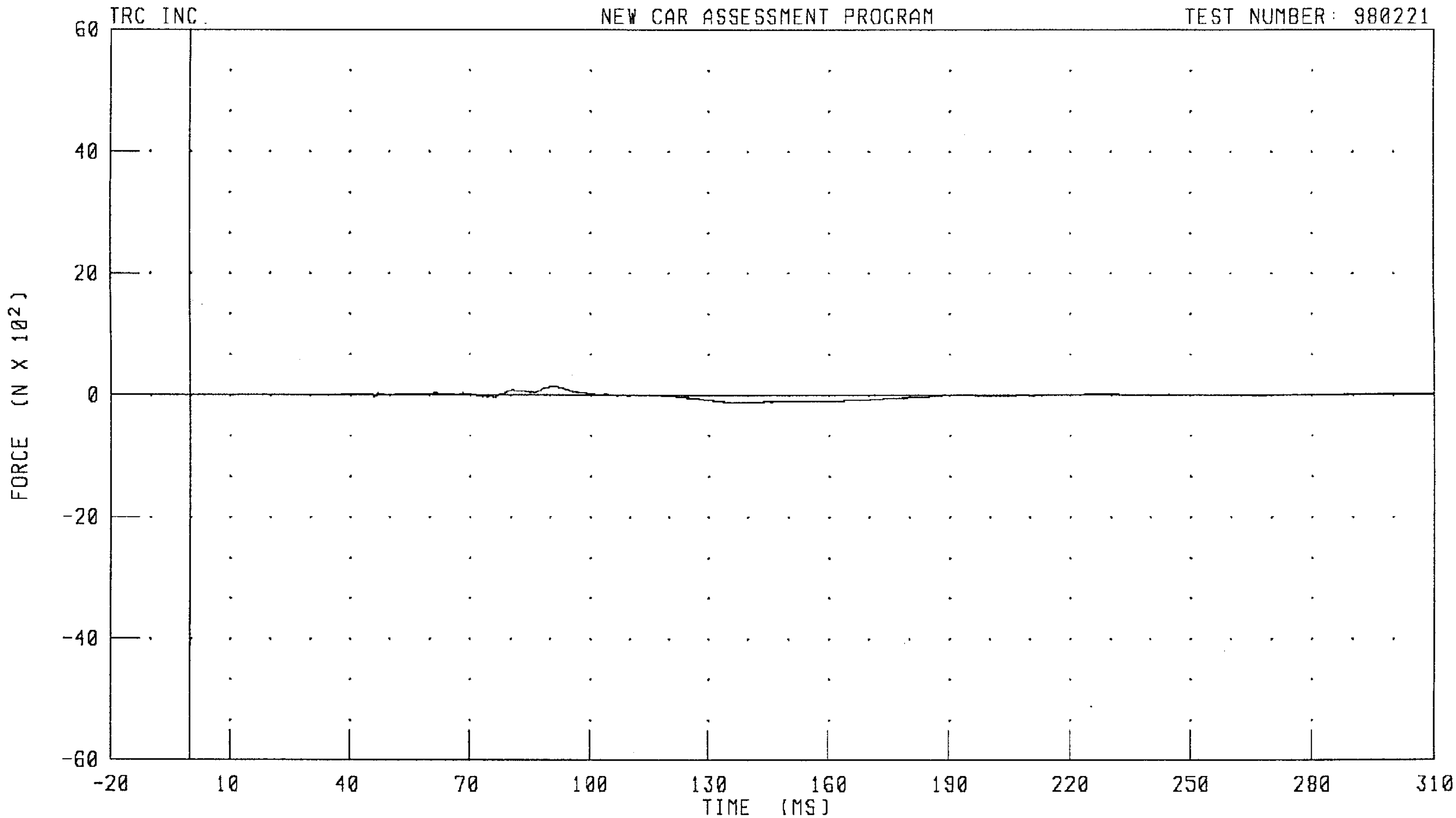
CHANNEL: HEDRG2   FILTER: CH. CLASS 1000   PEAK DATA: 82.82 G @ 83.20 MS; 0.07 G @ -20.00 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER NECK X-AXIS SHEAR FORCE
NEW CAR ASSESSMENT PROGRAM



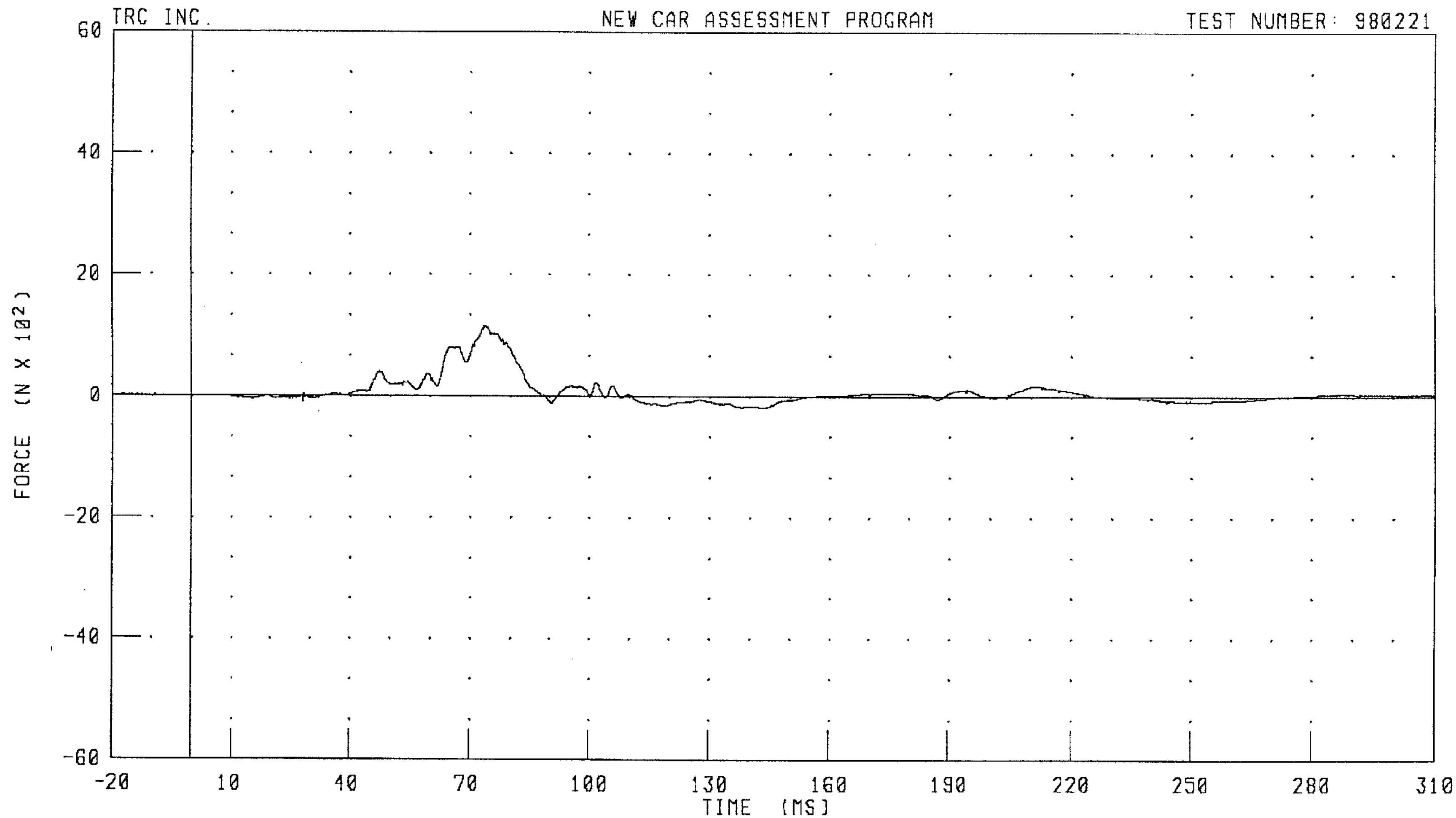
CHANNEL: NEKXF2 FILTER: CH. CLASS 1000 PEAK DATA: 148.45 N @ 309.44 MS; -847.15 N @ 88.16 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER NECK Y-AXIS SHEAR FORCE
NEW CAR ASSESSMENT PROGRAM



CHANNEL: NEKYF2 FILTER: CH. CLASS 1000 PEAK DATA: 133.40 N @ 90.24 MS; -123.08 N @ 136.56 MS

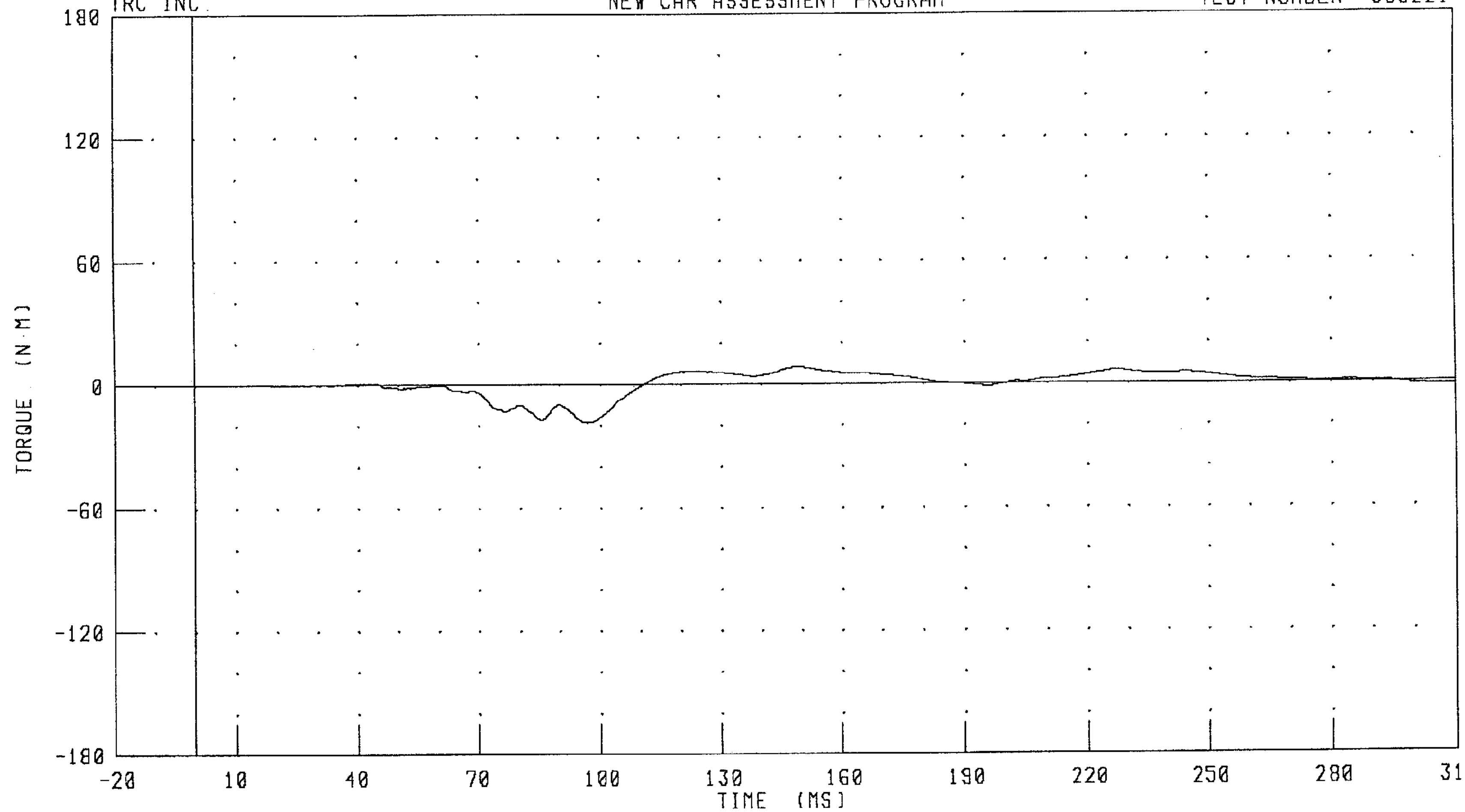
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER NECK Z-AXIS AXIAL FORCE
NEW CAR ASSESSMENT PROGRAM



CHANNEL: NEKZF2 FILTER: CH. CLASS 1000 PEAK DATA: 1153.36 N @ 73.68 MS; -188.99 N @ 142.72 MS

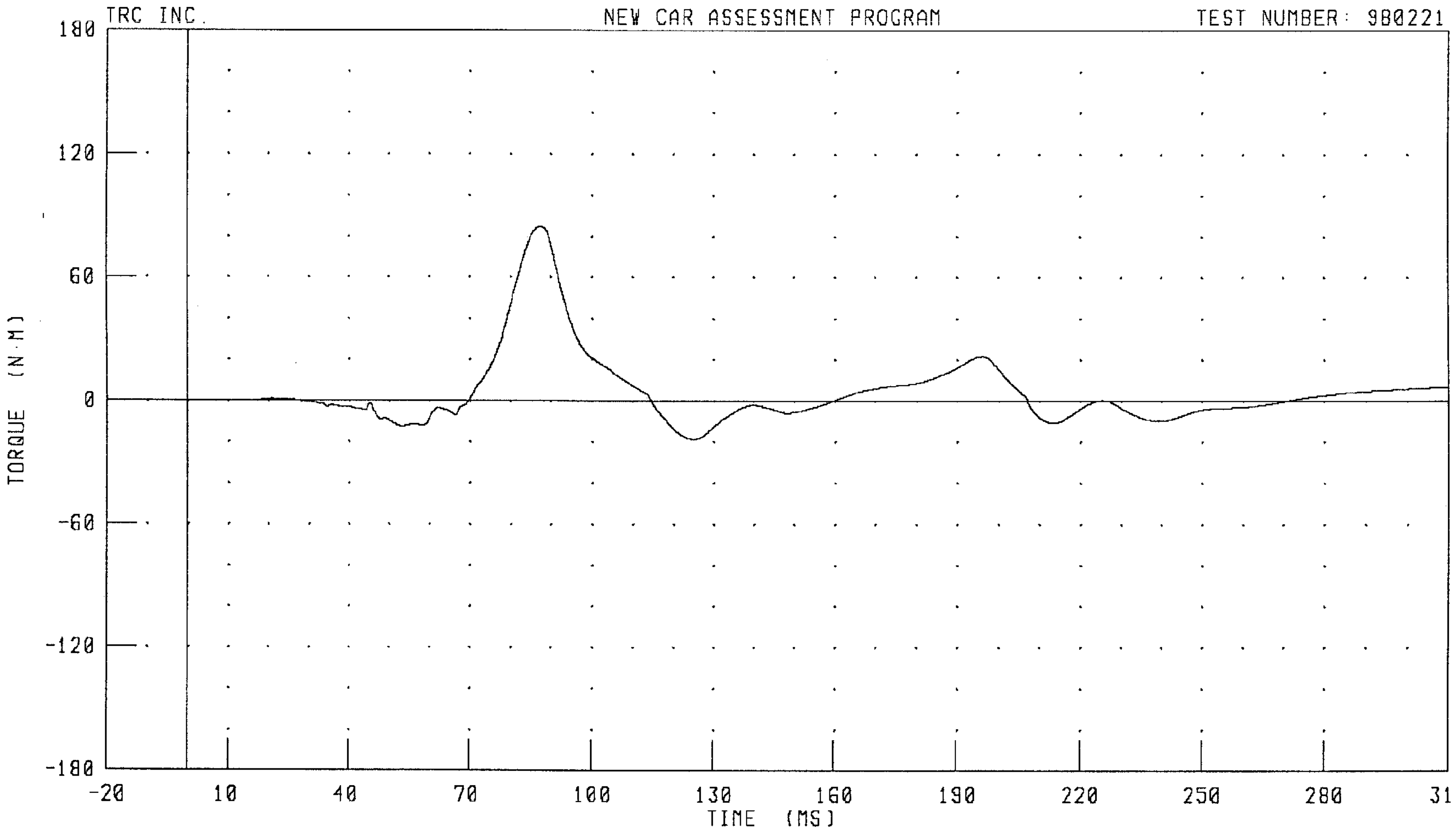
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER NECK MOMENT ABOUT X AXIS
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 980221



CHANNEL: NEKXM2   FILTER: CH. CLASS 600   PEAK DATA: 8.29 N·M @ 149.44 MS; -18.52 N·M @ 96.80 MS

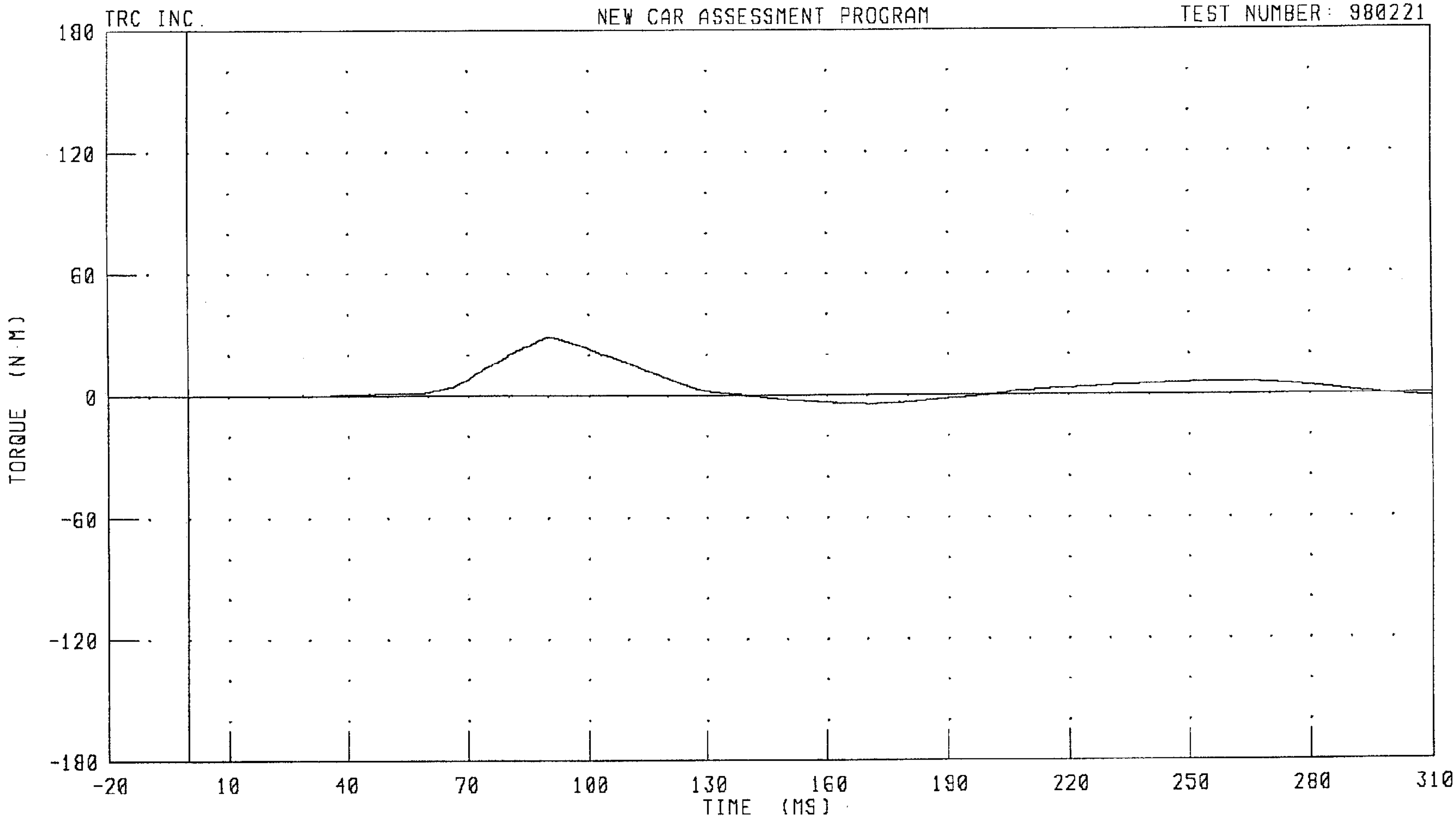
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER NECK MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM



CHANNEL: NEKYM2 FILTER: CH. CLASS 600

PEAK DATA: 84.95 N·M @ 87.68 MS; -18.67 N·M @ 125.28 MS

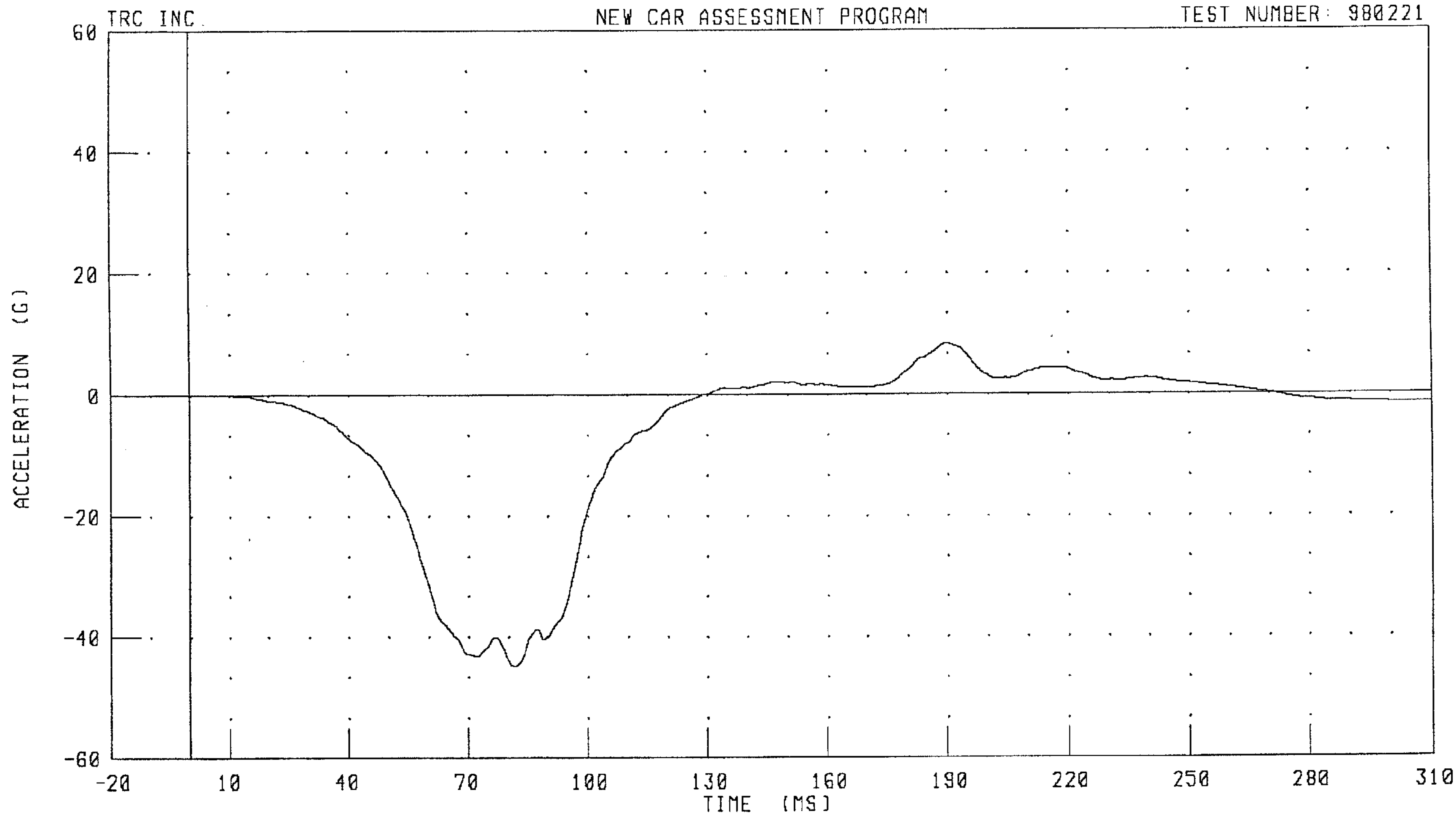
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER NECK MOMENT ABOUT Z AXIS
NEW CAR ASSESSMENT PROGRAM



CHANNEL: NEKZM2 FILTER: CH. CLASS 600

PEAK DATA: 28.52 N·M @ 89.84 MS; -4.51 N·M @ 170.24 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENCER CHEST X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

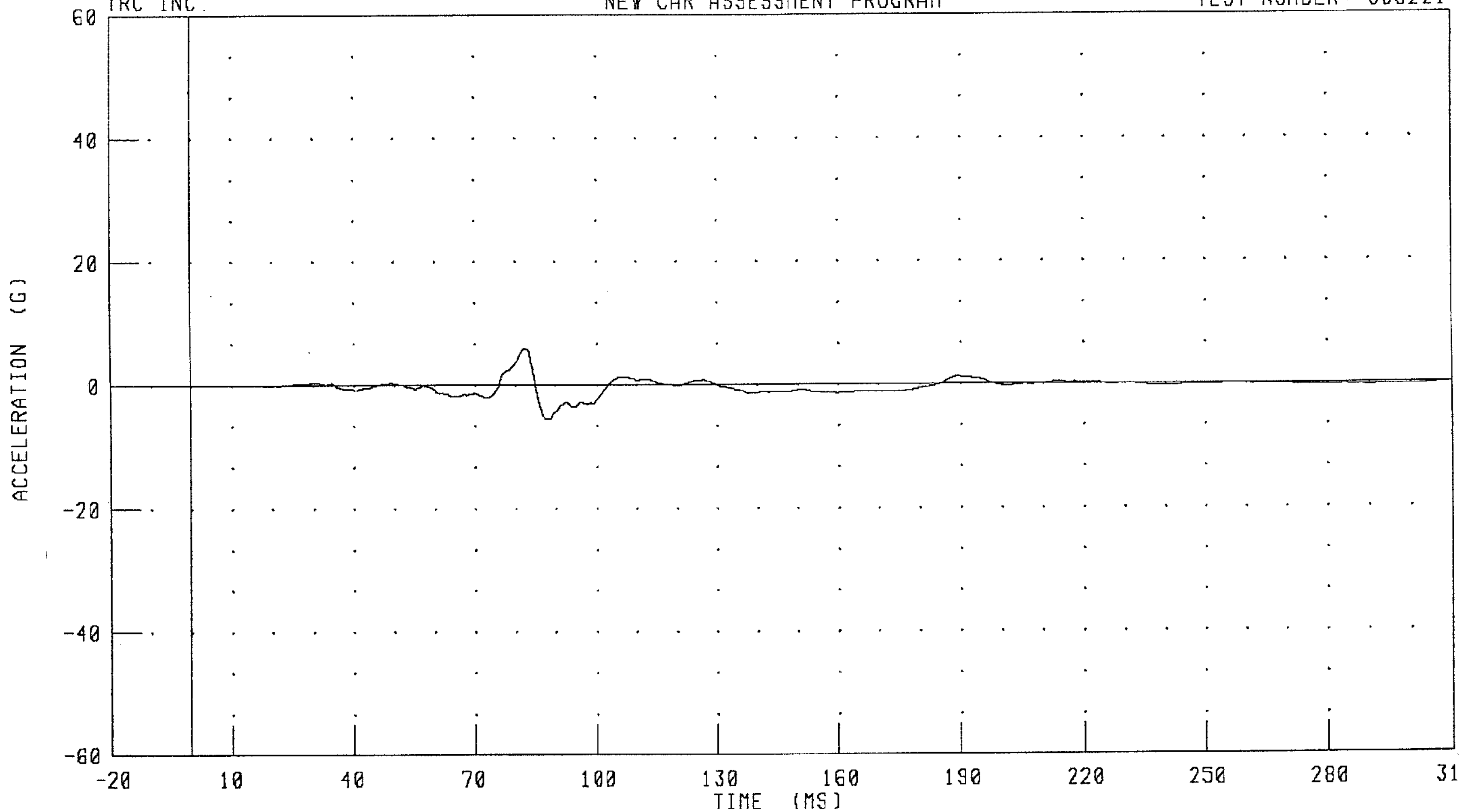


CHANNEL: CSTXG2 FILTER: CH. CLASS 180 PEAK DATA: 8.38 G @ 189.92 MS; -44.90 G @ 81.76 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TRC INC.

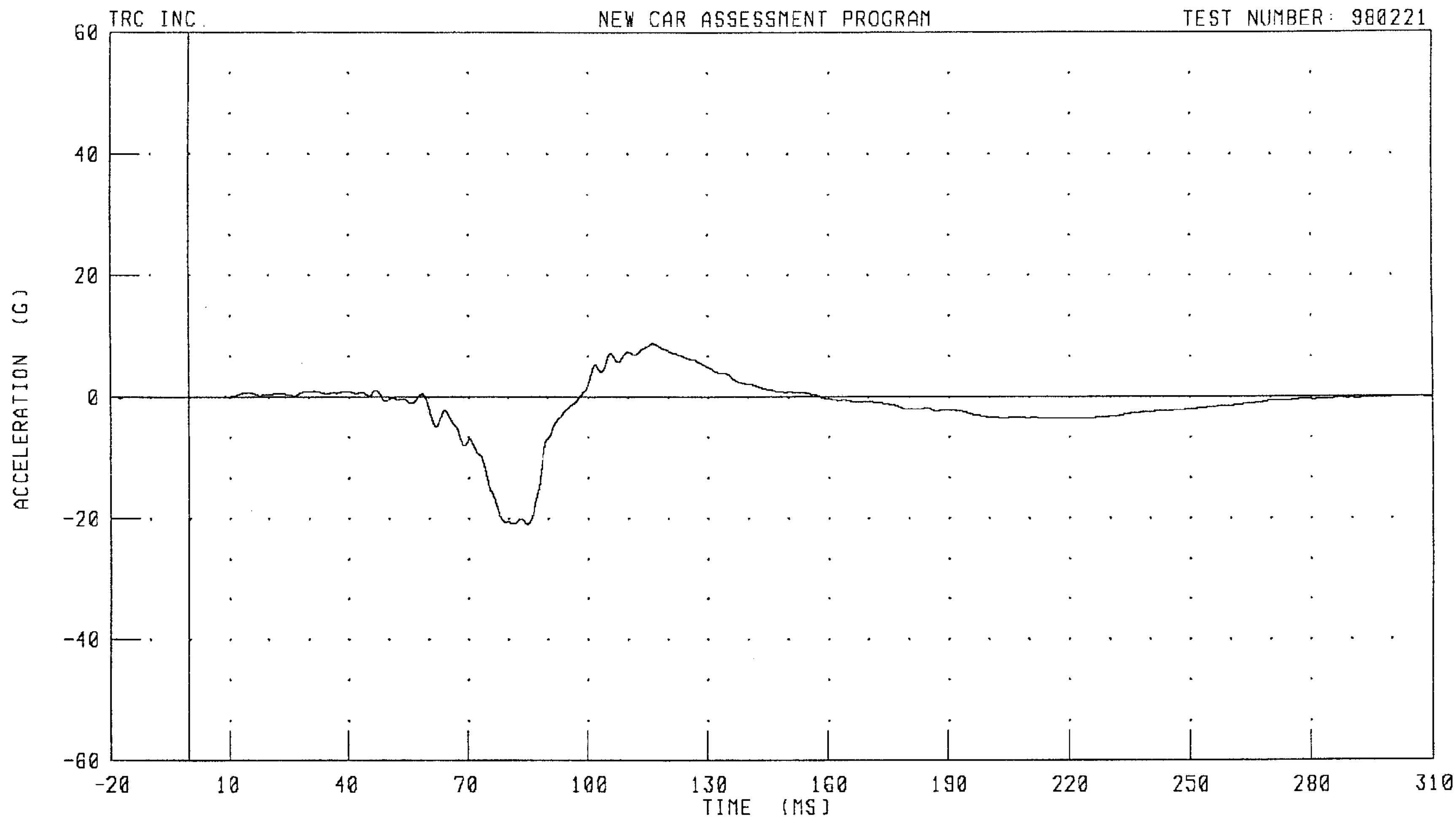
TEST NUMBER: 980221



CHANNEL: CSTYG2 FILTER: CH. CLASS 180

PEAK DATA: 5.92 G @ 82.32 MS; -5.61 G @ 88.48 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

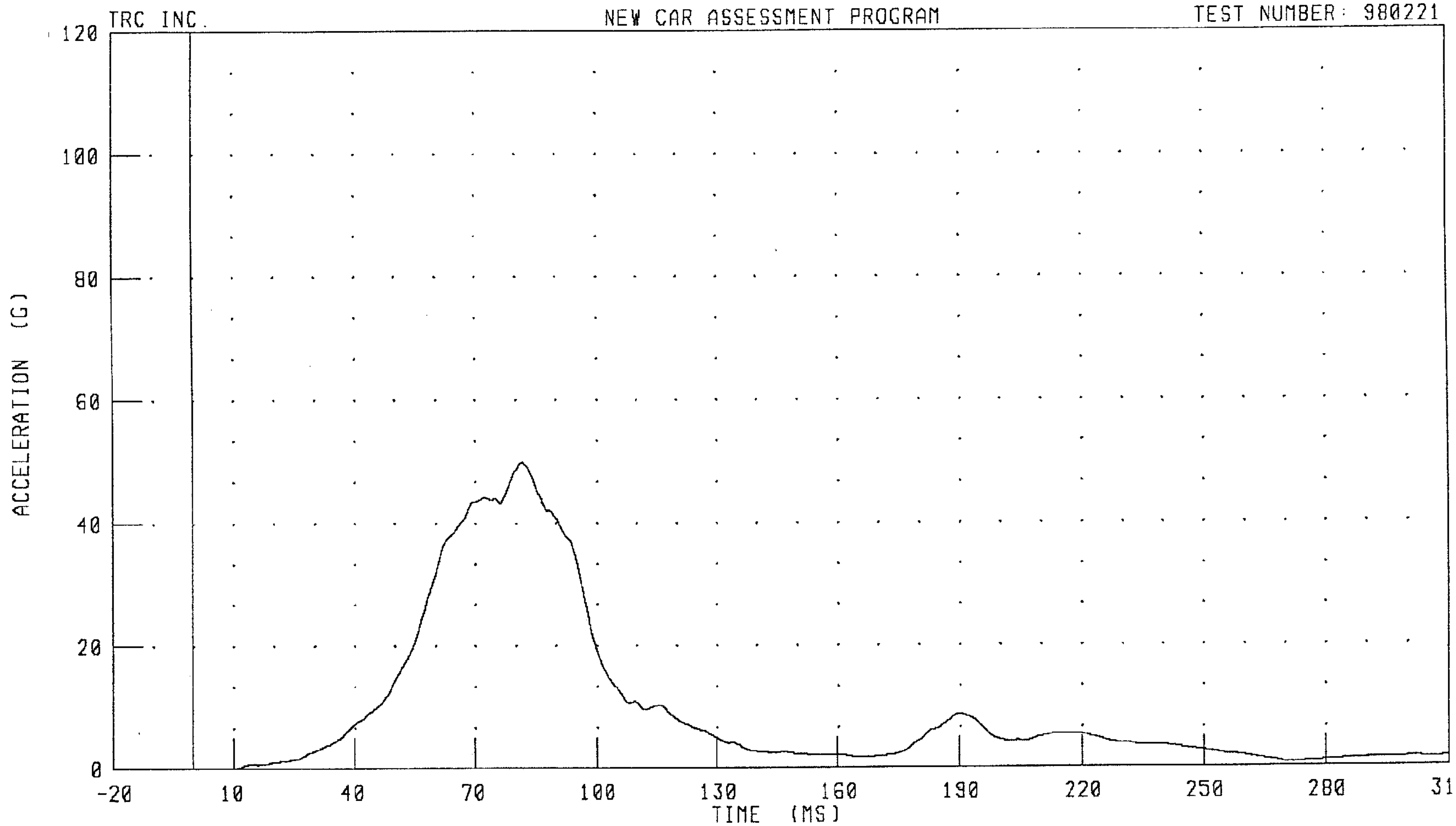


CHANNEL: CSTZG2 FILTER: CH. CLASS 180 PEAK DATA: 8.76 G @ 116.48 MS; -20.90 G @ 84.80 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION
NEW CAR ASSESSMENT PROGRAM

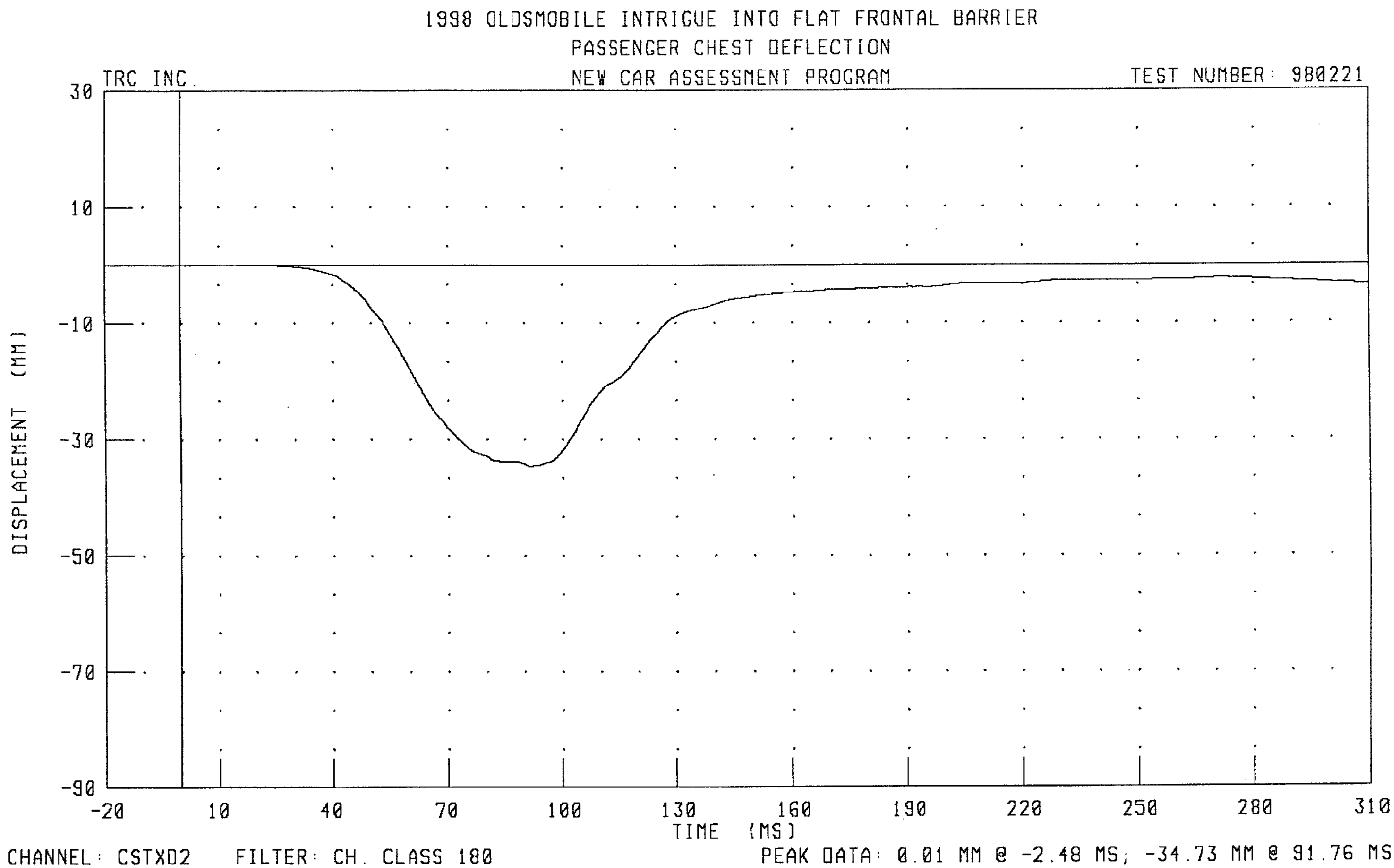
TRC INC.

TEST NUMBER: 980221

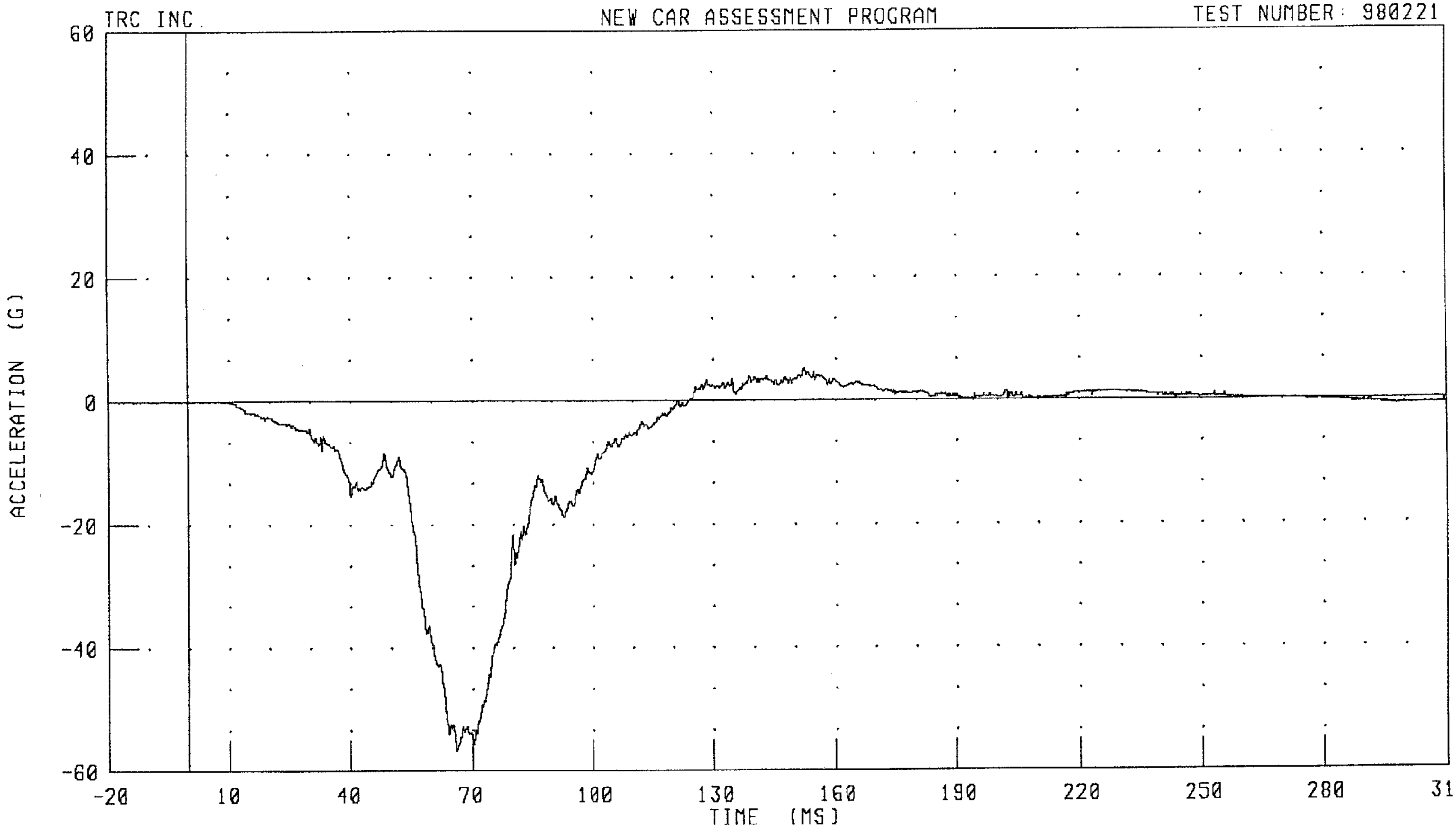


CHANNEL: CSTRG2 FILTER: CH. CLASS 180

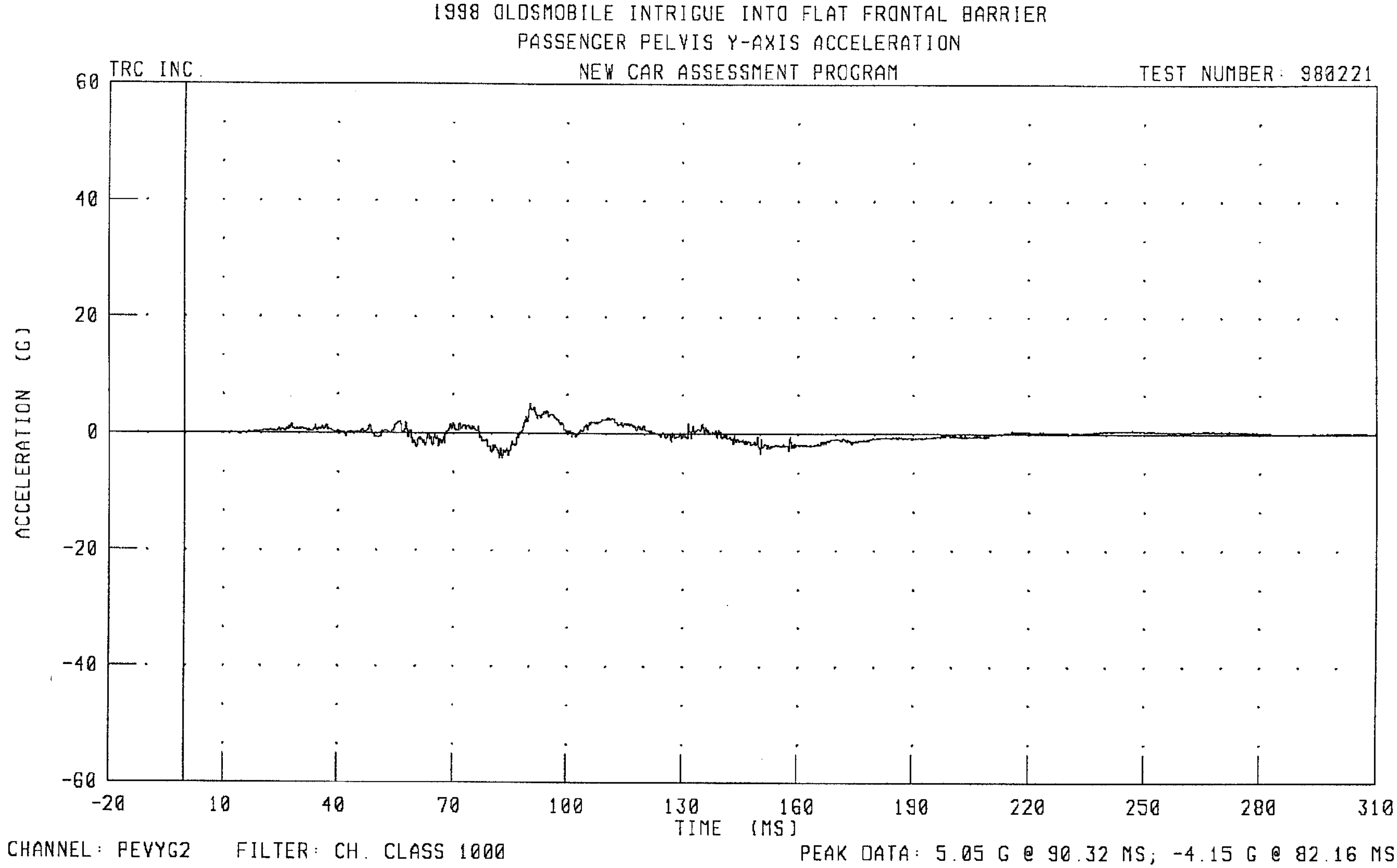
PEAK DATA: 49.81 G @ 81.76 MS; 0.01 G @ -20.00 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST DEFLECTION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
DISPLACEMENT (MM)
30
10
-10
-30
-50
-70
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD2
FILTER: CH. CLASS 180
PEAK DATA: 0.01 MM @ -2.48 MS; -34.73 MM @ 91.76 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER PELVIS X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



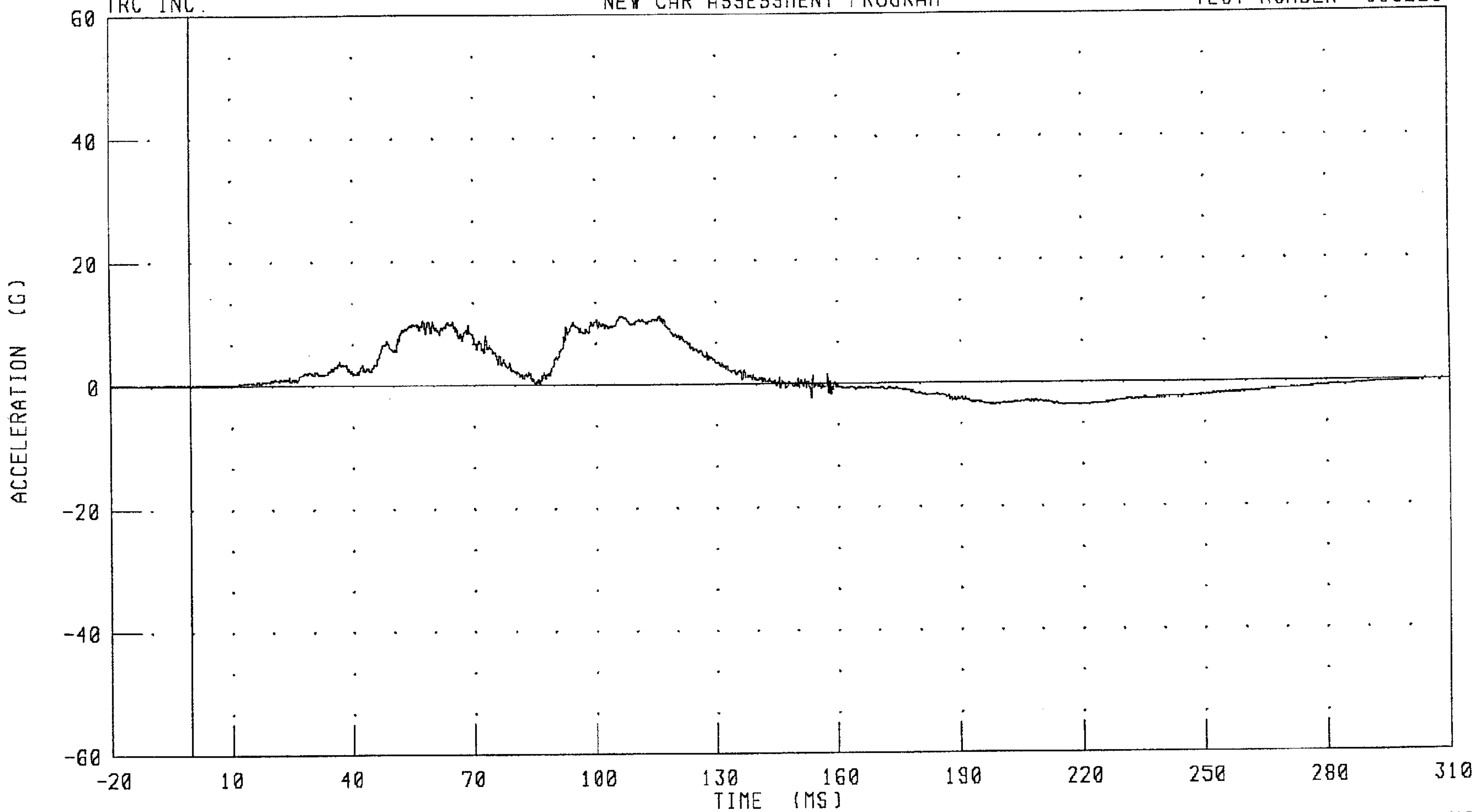
CHANNEL: PEVXG2 FILTER: CH. CLASS 1000 PEAK DATA: 5.32 G @ 152.48 MS; -56.65 G @ 66.00 MS



1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER PELVIS Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: PEVYG2
FILTER: CH. CLASS 1000
PEAK DATA: 5.05 G @ 90.32 MS; -4.15 G @ 82.16 MS

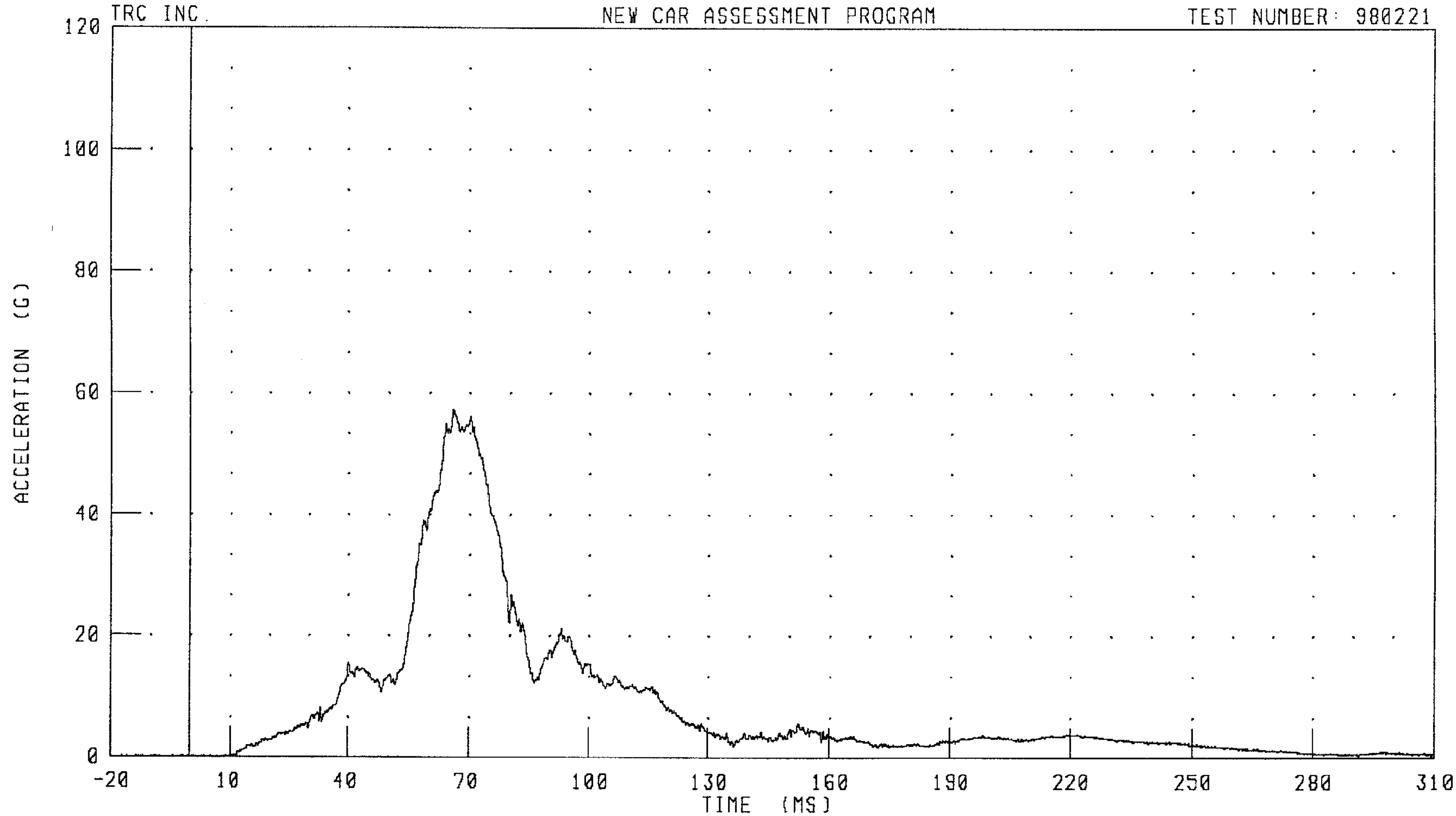
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER PELVIS Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221



CHANNEL: PEVZG2 FILTER: CH. CLASS 1000 PEAK DATA: 11.08 G @ 106.32 MS; -3.80 G @ 215.36 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER PELVIS RESULTANT ACCELERATION
NEW CAR ASSESSMENT PROGRAM

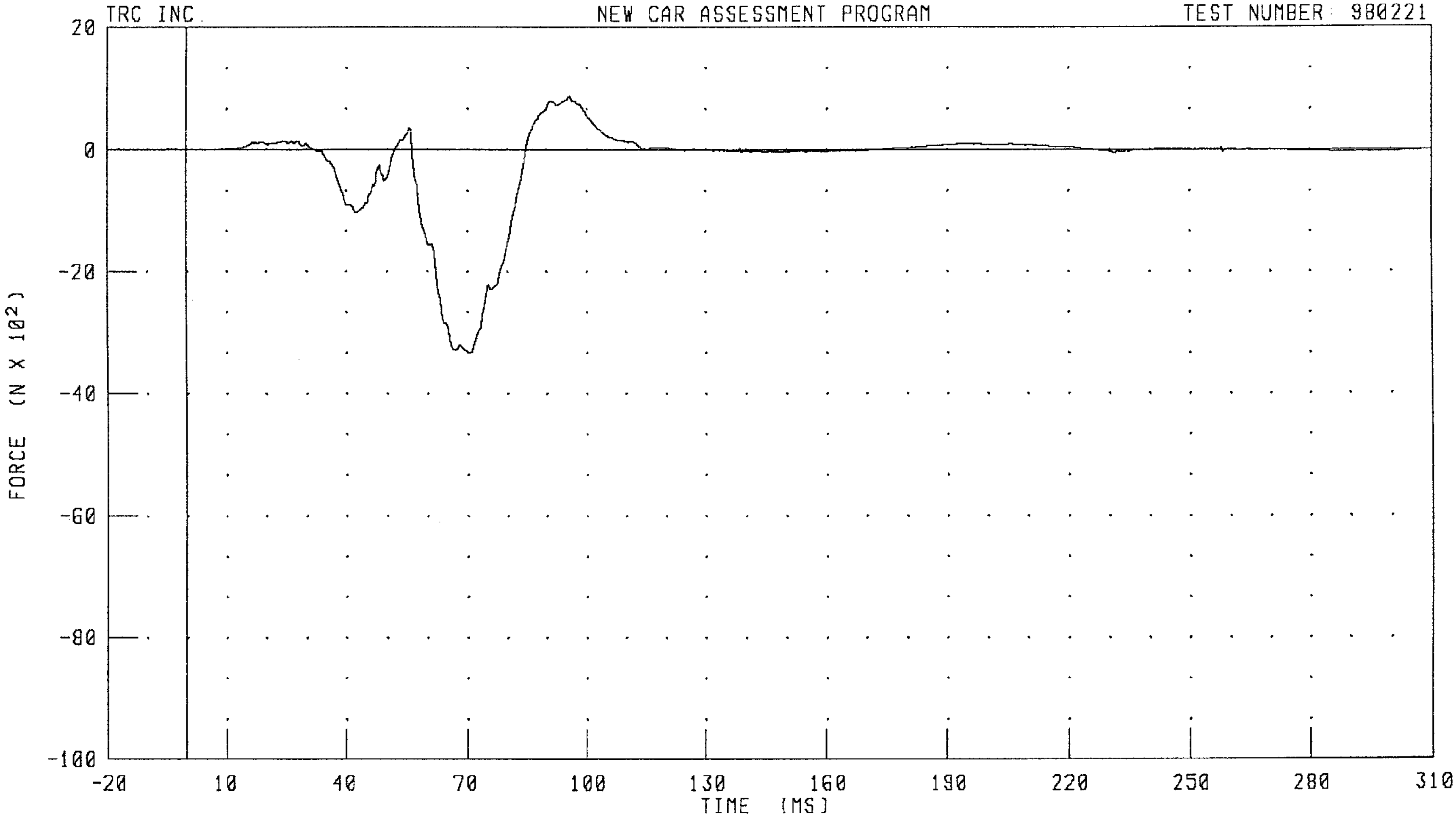


CHANNEL: PEVRG2 FILTER: CH. CLASS 1000 PEAK DATA: 57.37 G @ 66.08 MS; 0.09 G @ -20.00 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT FEMUR FORCE
NEW CAR ASSESSMENT PROGRAM

TRC INC.

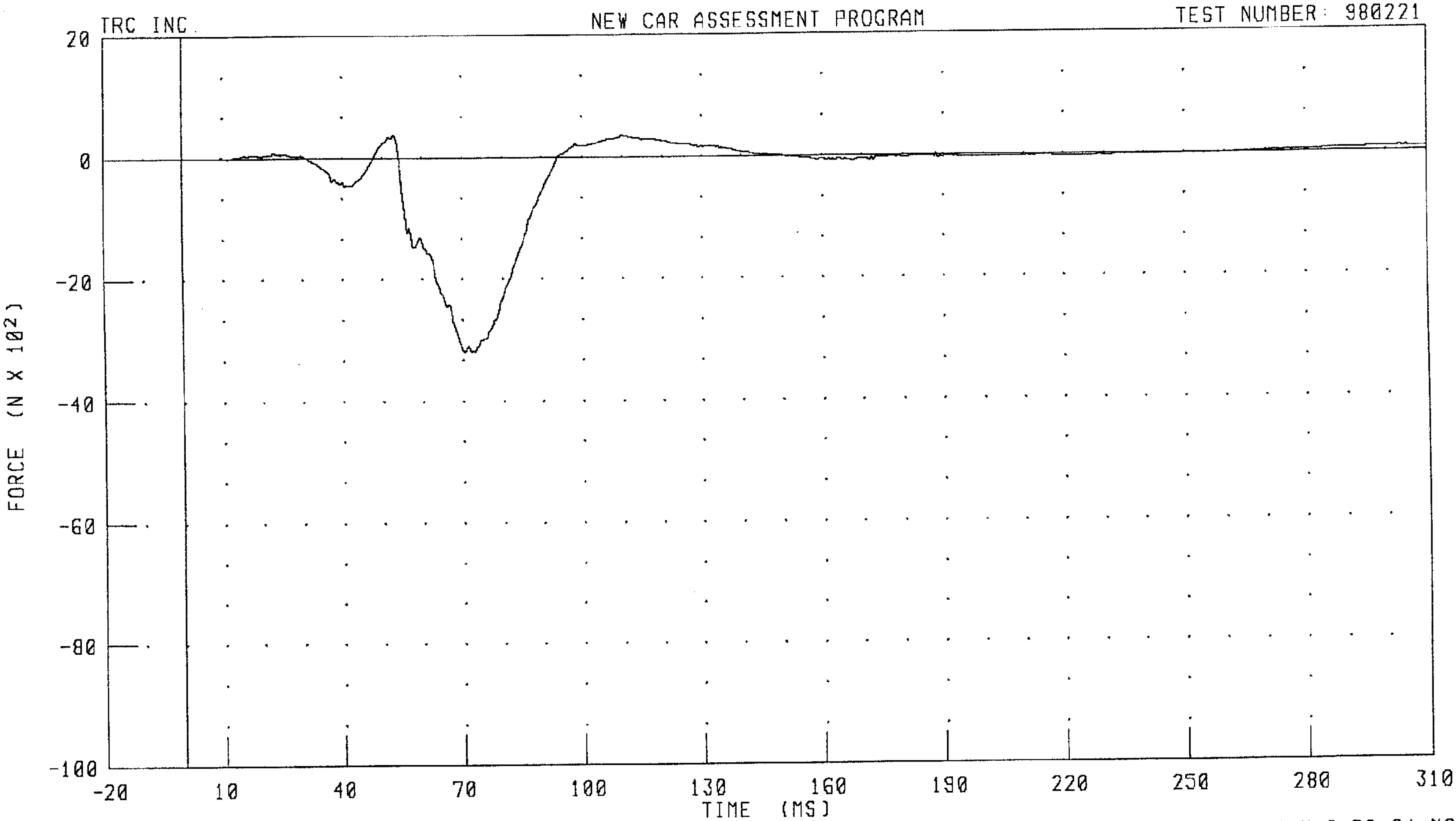
TEST NUMBER: 980221



CHANNEL: LFMF2 FILTER: CH. CLASS 600 PEAK DATA: 869.07 N @ 95.84 MS; -3339.53 N @ 70.56 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT FEMUR FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 980221

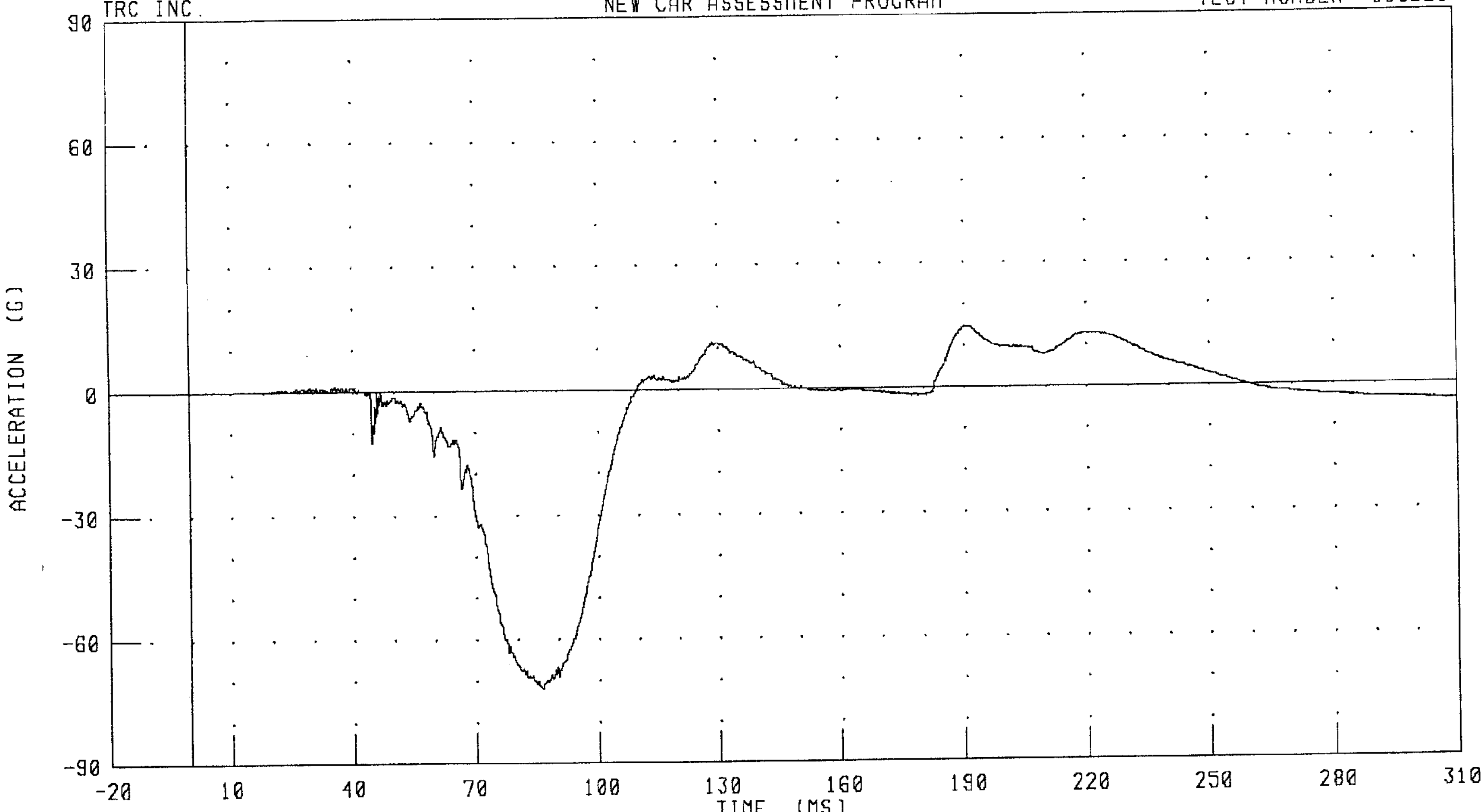


CHANNEL: RFMF2 FILTER: CH. CLASS 600

PEAK DATA: 367.71 N @ 53.12 MS; -3210.25 N @ 70.64 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221

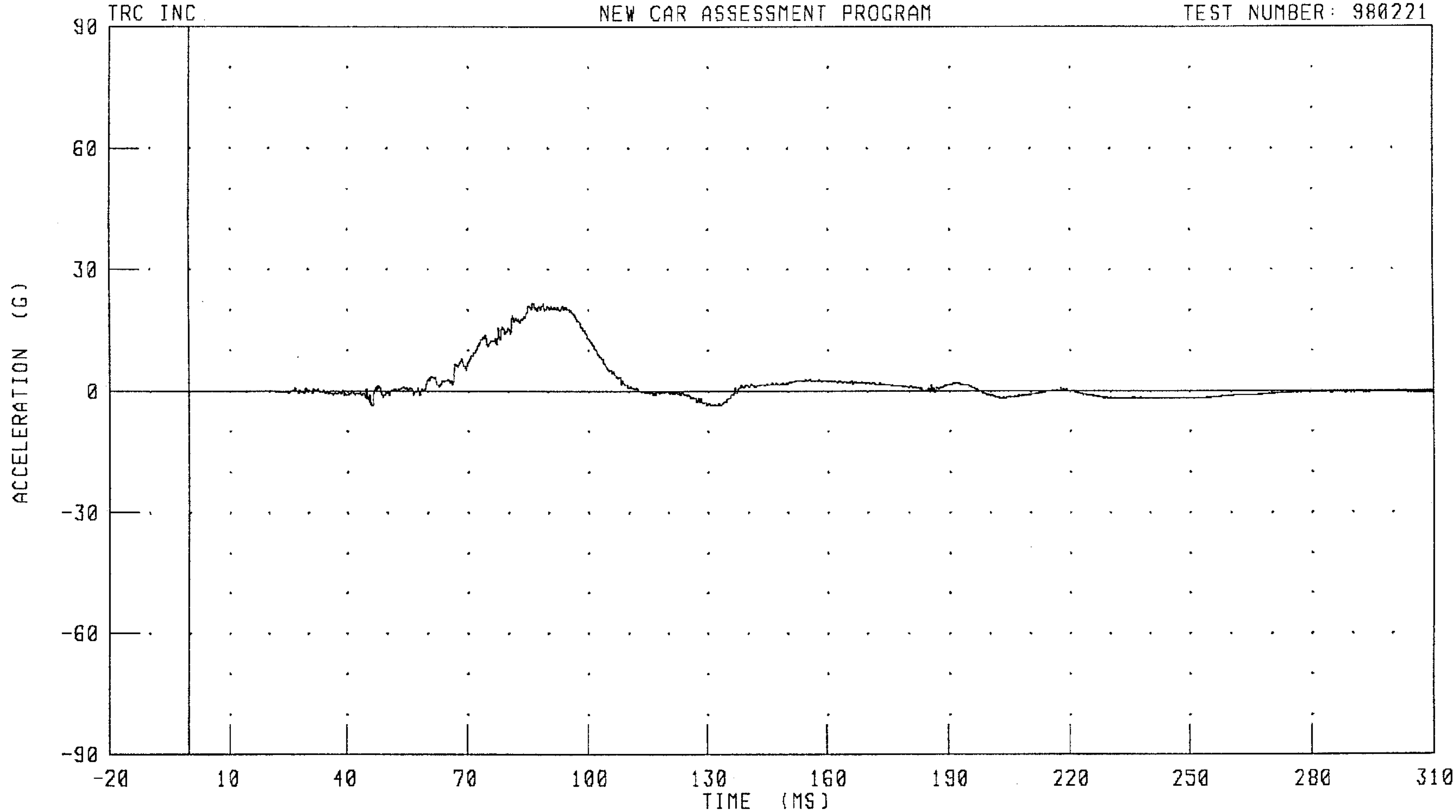


CHANNEL: HEDXR2 FILTER: CH. CLASS 1000 PEAK DATA: 14.79 G @ 190.32 MS; -71.95 G @ 86.16 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TRC INC

TEST NUMBER: 980221

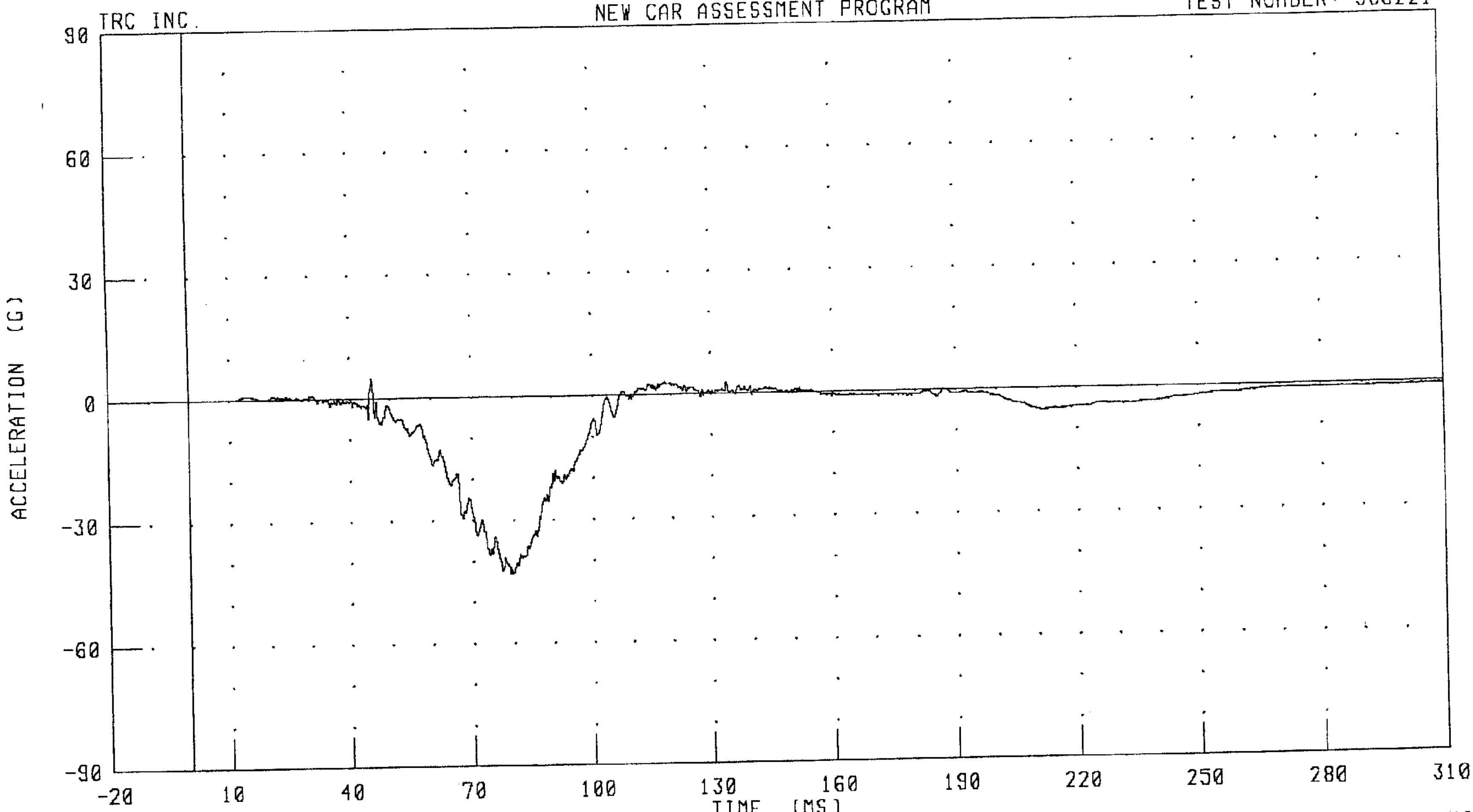


CHANNEL: HEDYR2 FILTER: CH. CLASS 1000

PEAK DATA: 21.73 G @ 86.16 MS; -3.65 G @ 46.40 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 980221

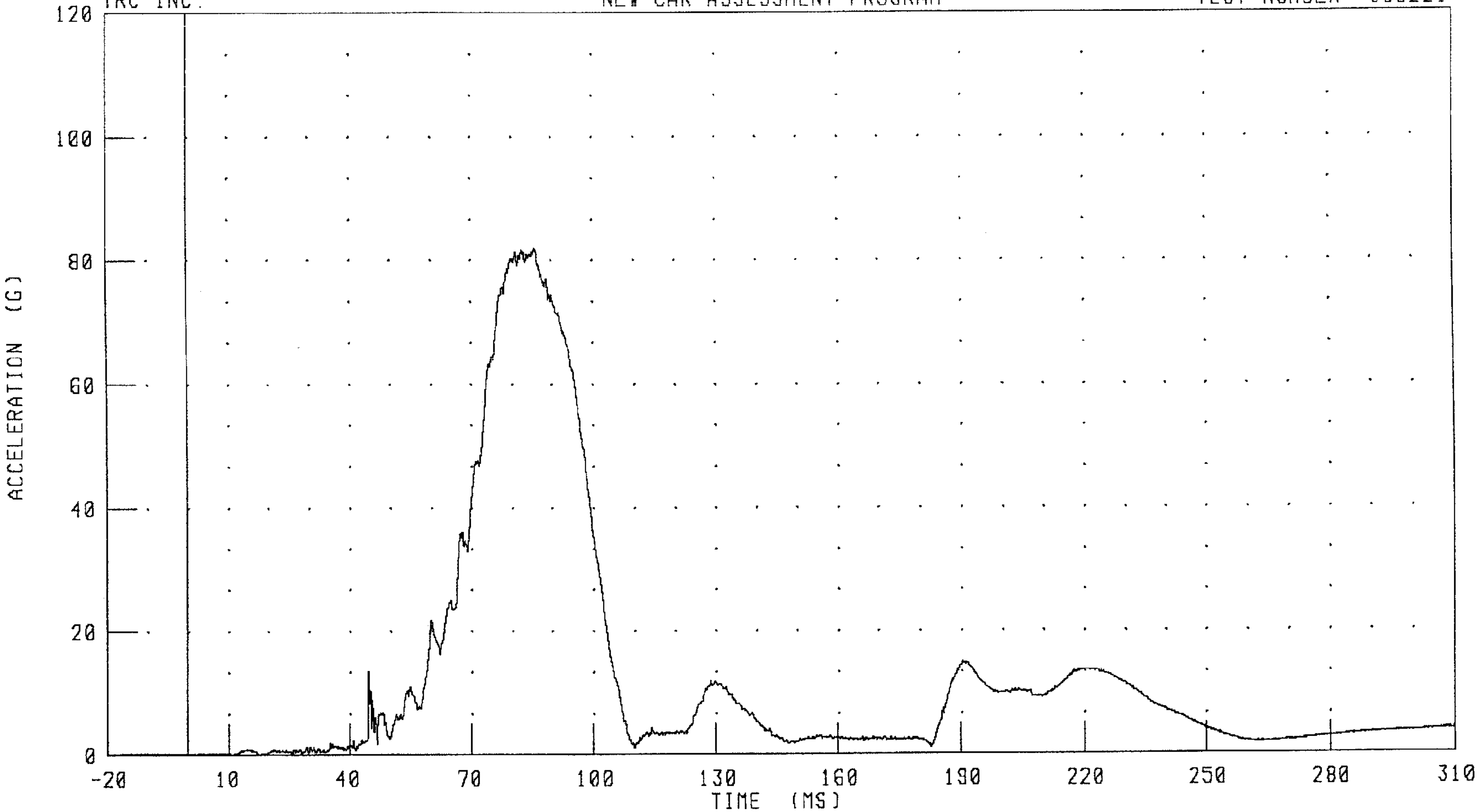


CHANNEL: HEDZR2   FILTER: CH. CLASS 1000

PEAK DATA: 4.82 G @ 45.52 MS; -43.28 G @ 79.12 MS

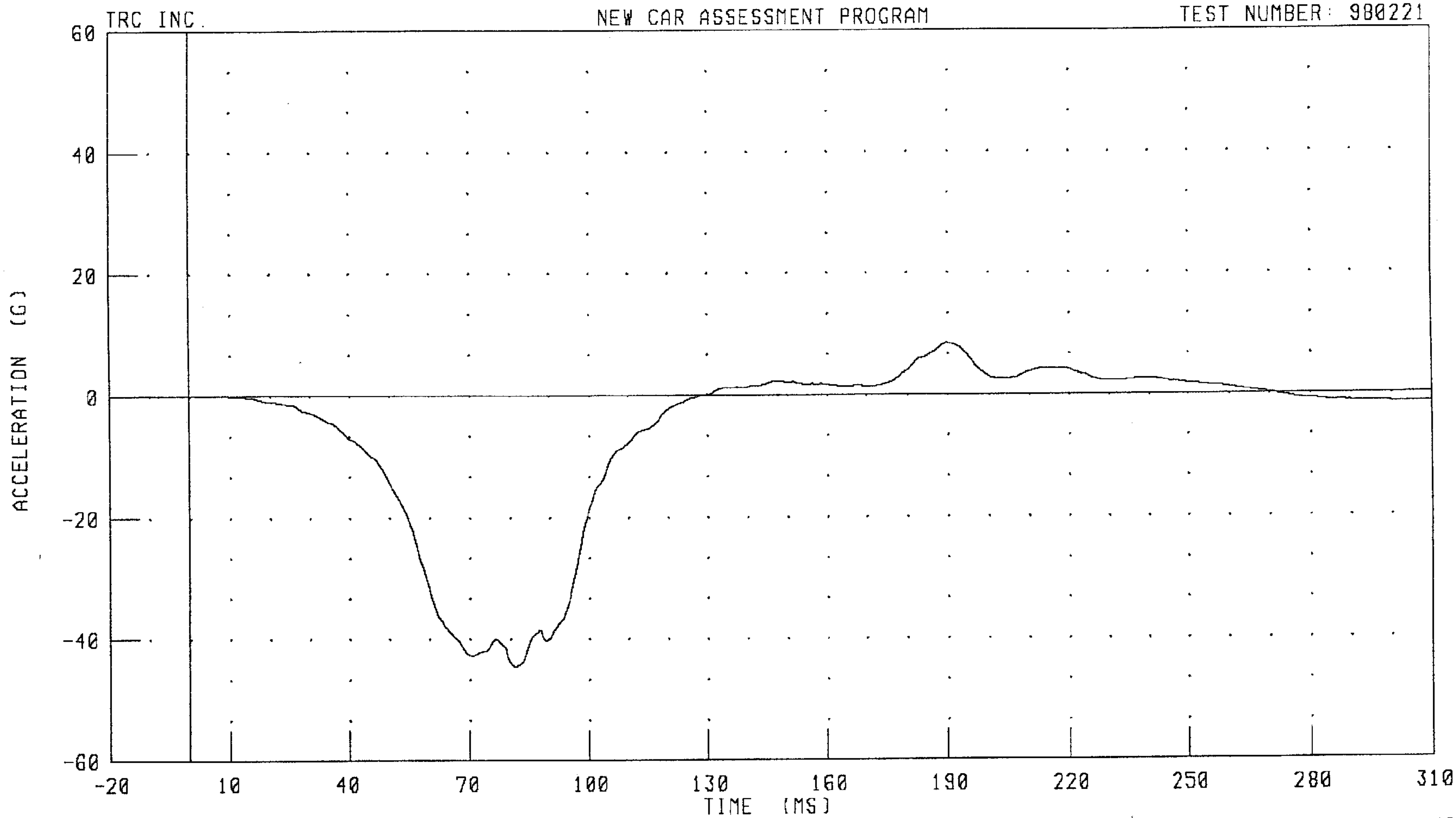
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221



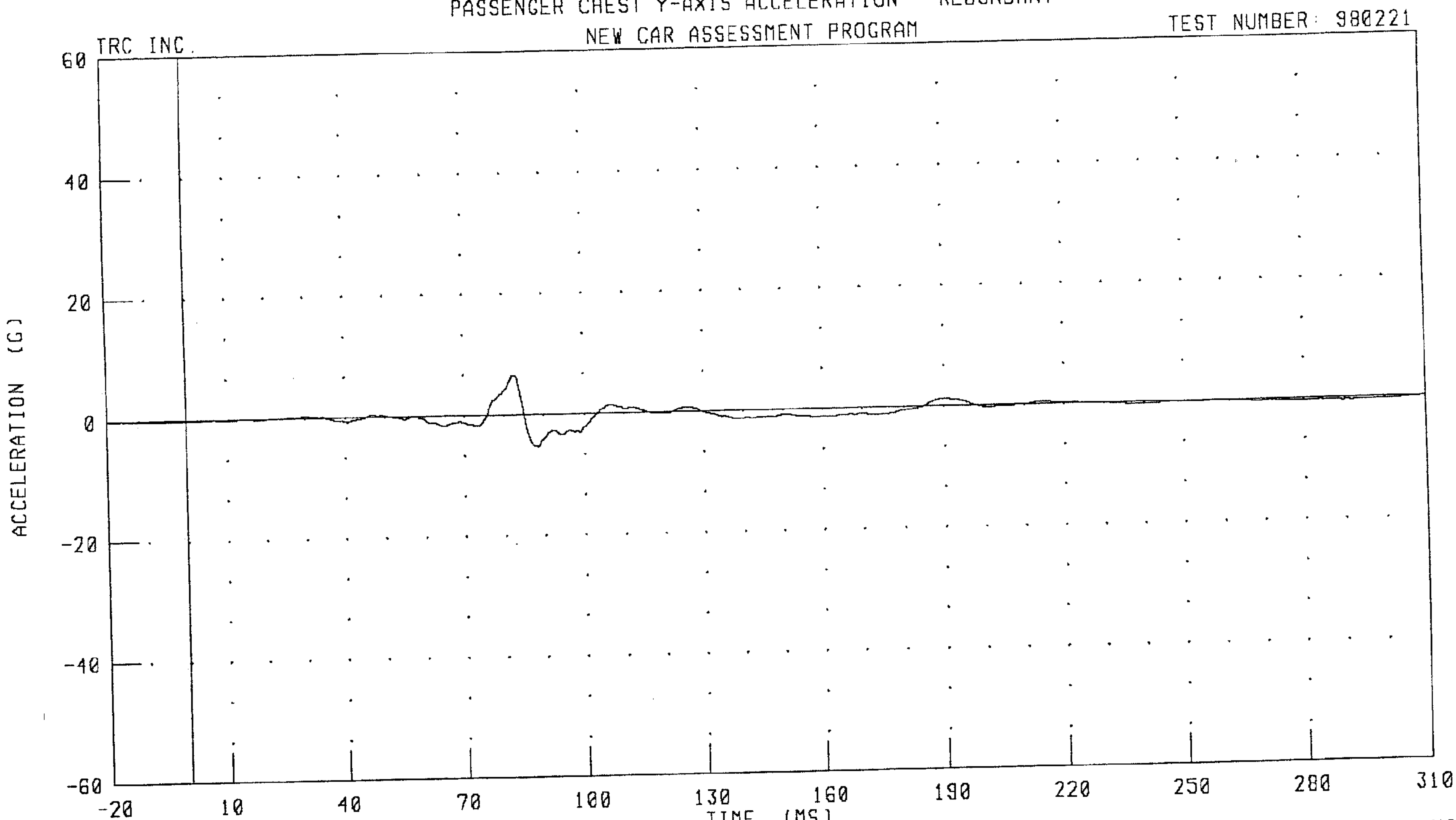
CHANNEL: HEDRR2 FILTER: CH. CLASS 1000 PEAK DATA: 81.96 G @ 86.00 MS; 0.14 G @ -18.48 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM



CHANNEL: CSTXR2 FILTER: CH. CLASS 180 PEAK DATA: 8.41 G @ 189.84 MS; -44.49 G @ 81.60 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

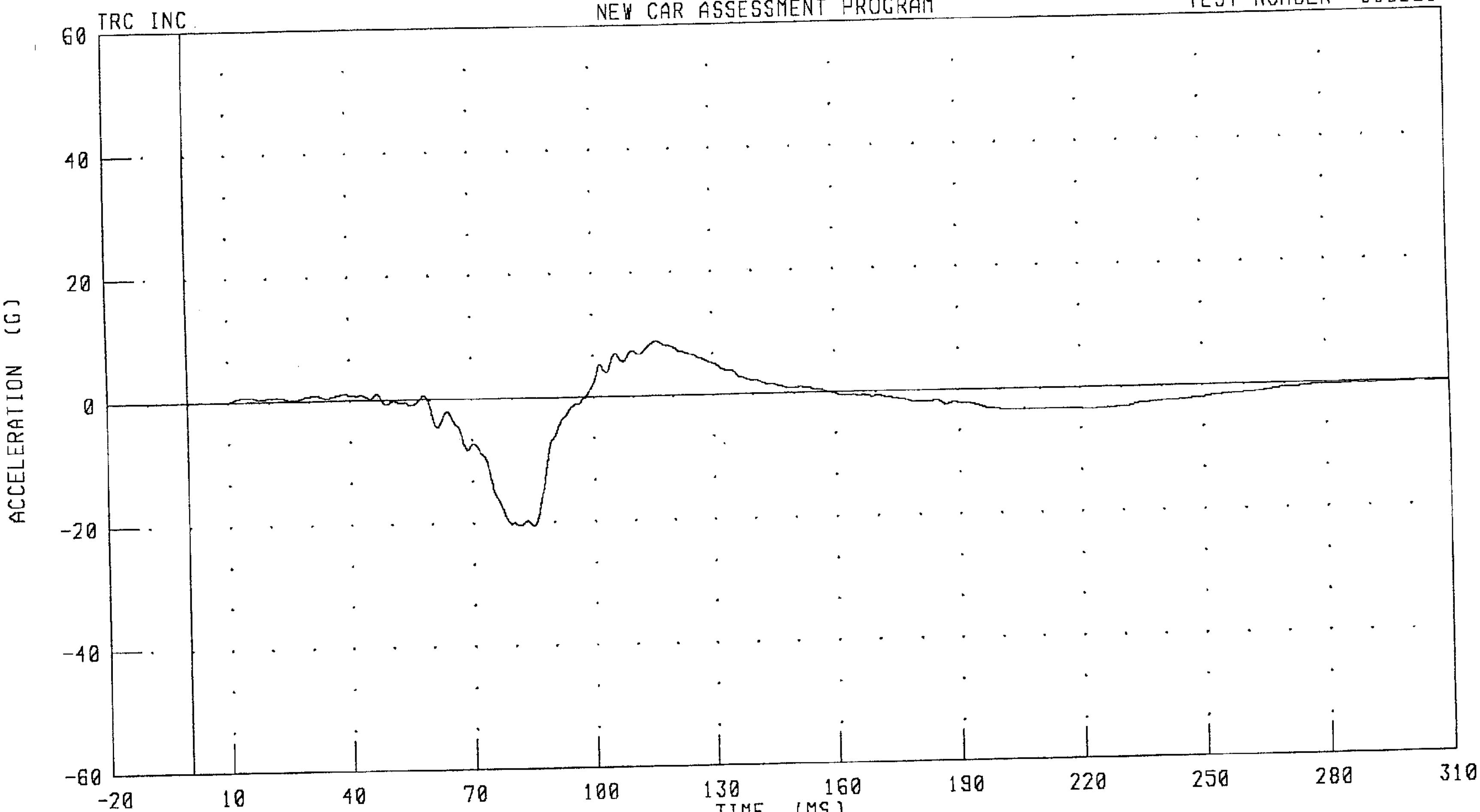


CHANNEL: CSTYR2 FILTER: CH. CLASS 180

PEAK DATA: 6.45 G @ 82.56 MS; -5.33 G @ 88.56 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 980221

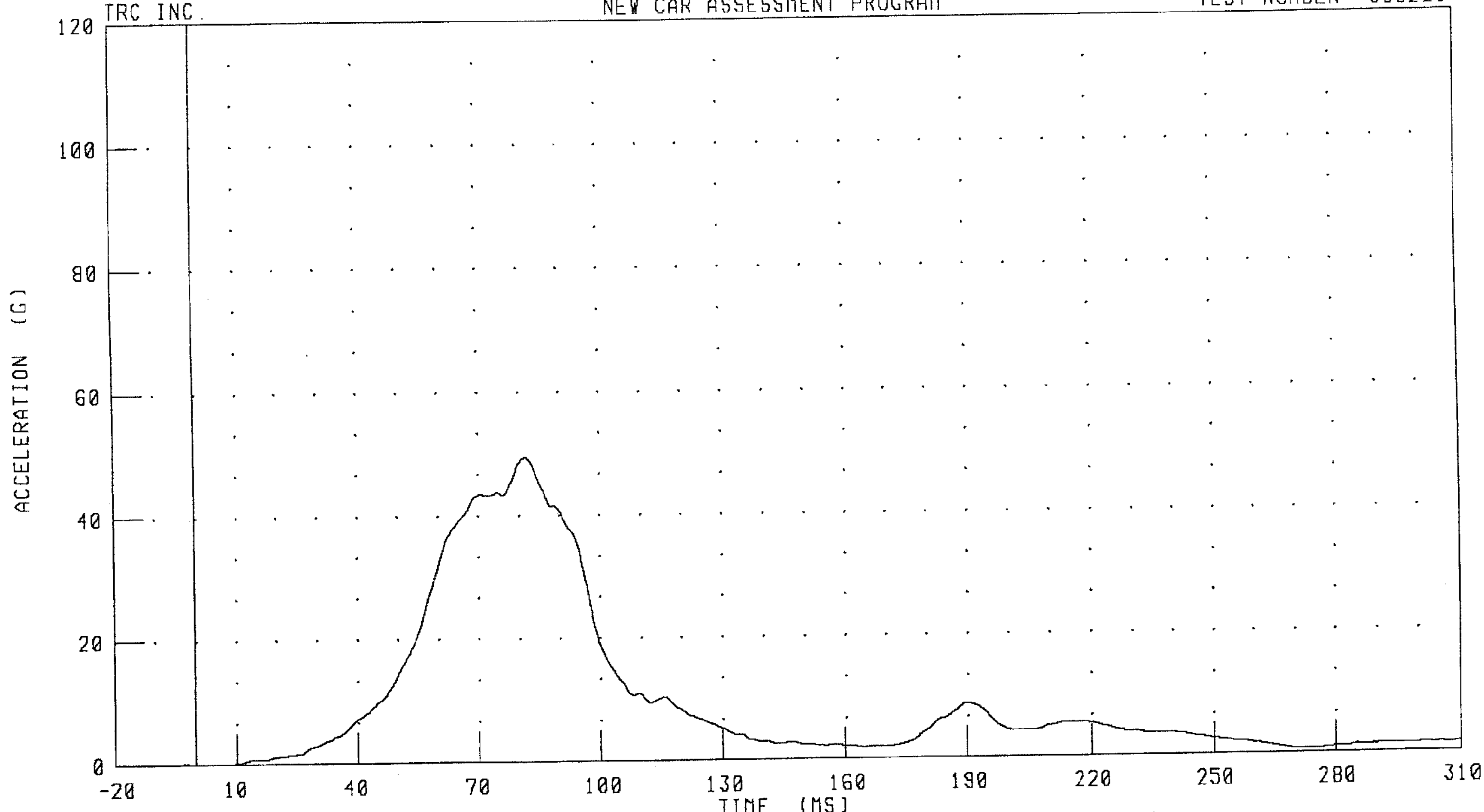


CHANNEL: CSTZR2 FILTER: CH. CLASS 180

PEAK DATA: 8.84 G @ 116.24 MS; -20.68 G @ 84.96 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 980221

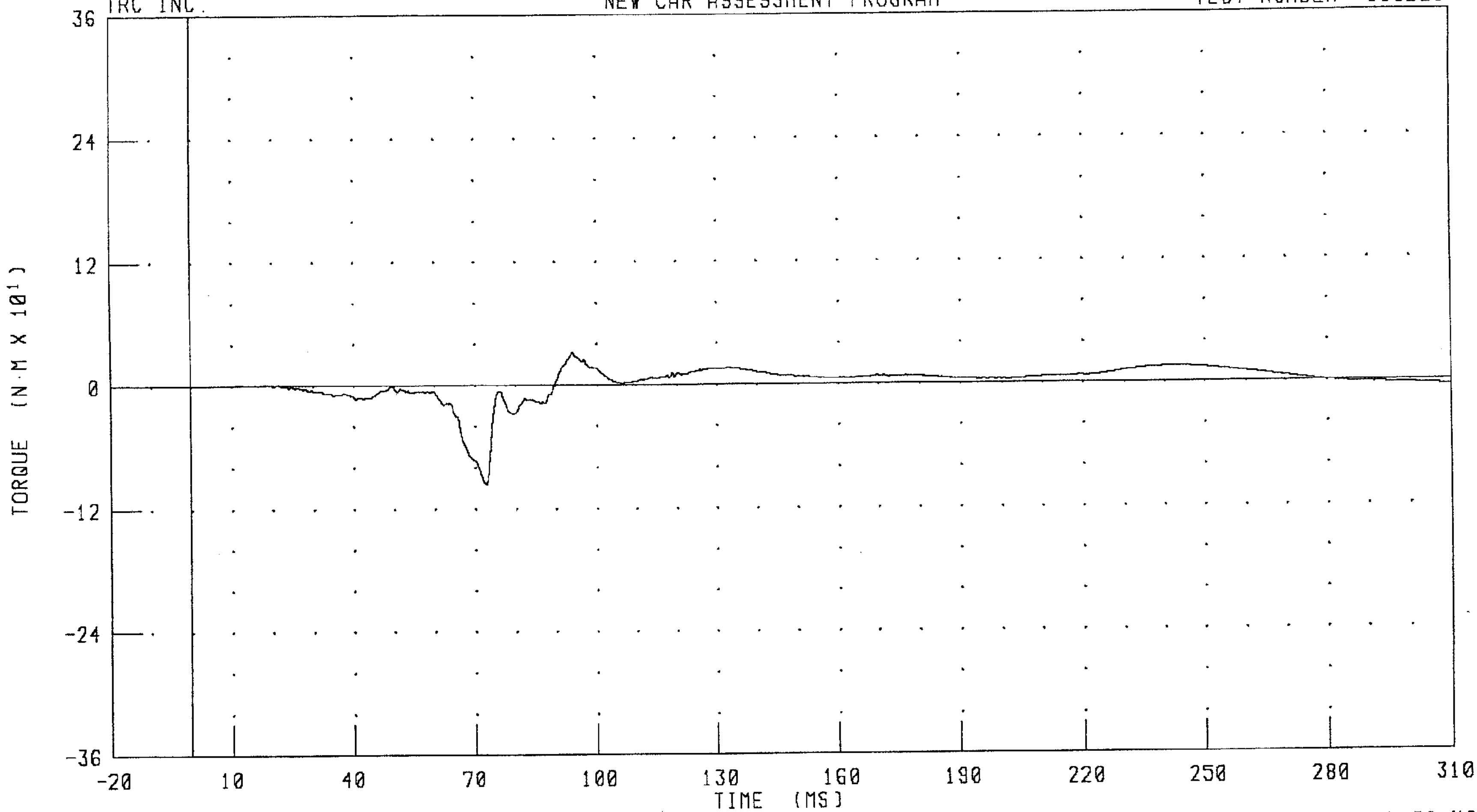


CHANNEL: CSTRR2 FILTER: CH. CLASS 180

PEAK DATA: 49.31 G @ 81.76 MS; 0.01 G @ -20.00 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT X AXIS
NEW CAR ASSESSMENT PROGRAM

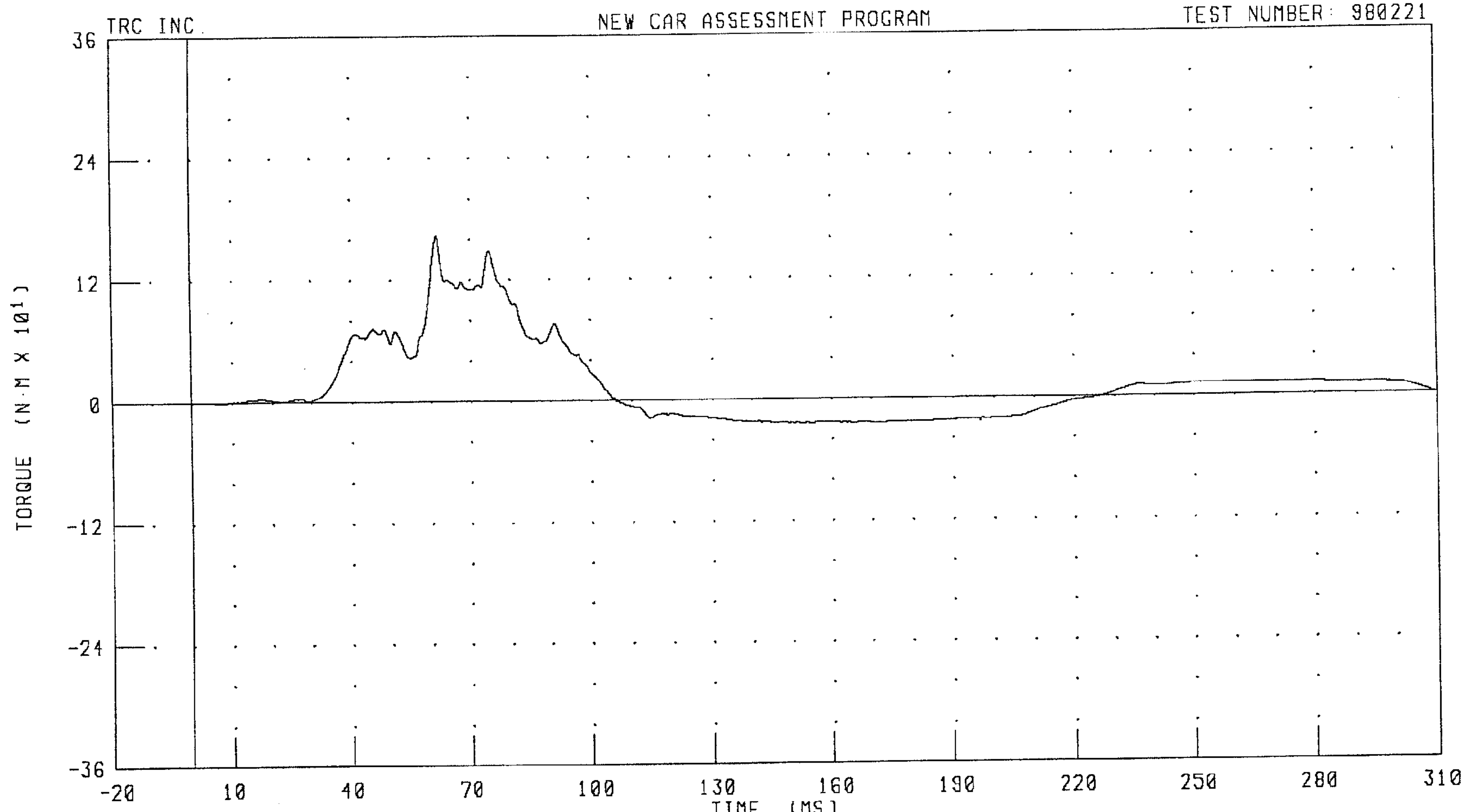
TRC INC. TEST NUMBER: 980221



CHANNEL: TBLXM2 FILTER: CH. CLASS 600 PEAK DATA: 31.25 N·M @ 94.24 MS; -96.24 N·M @ 72.80 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 980221

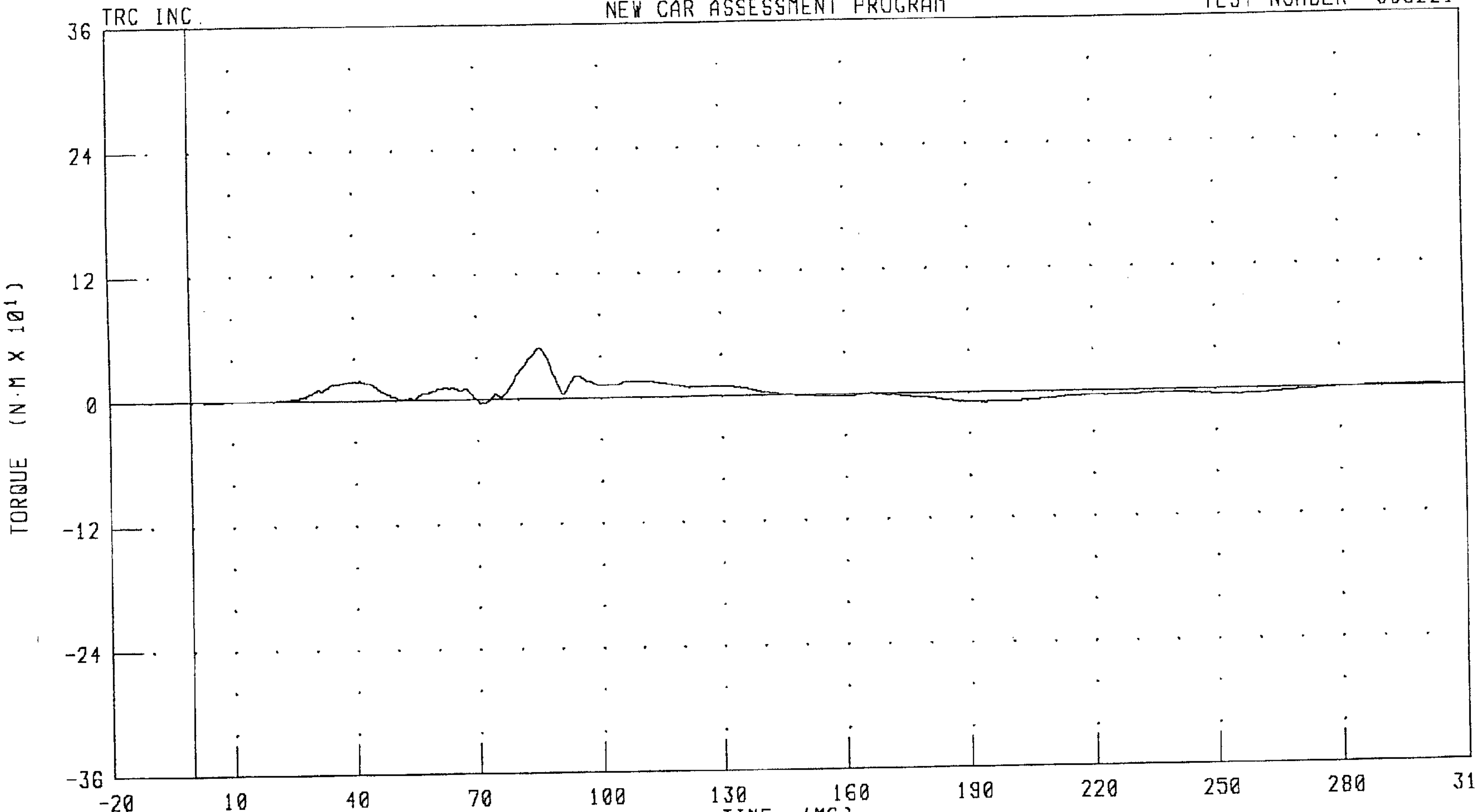


CHANNEL: TBLYM2   FILTER: CH. CLASS 600

PEAK DATA: 164.14 N·M @ 61.68 MS; -24.40 N·M @ 149.44 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS
NEW CAR ASSESSMENT PROGRAM

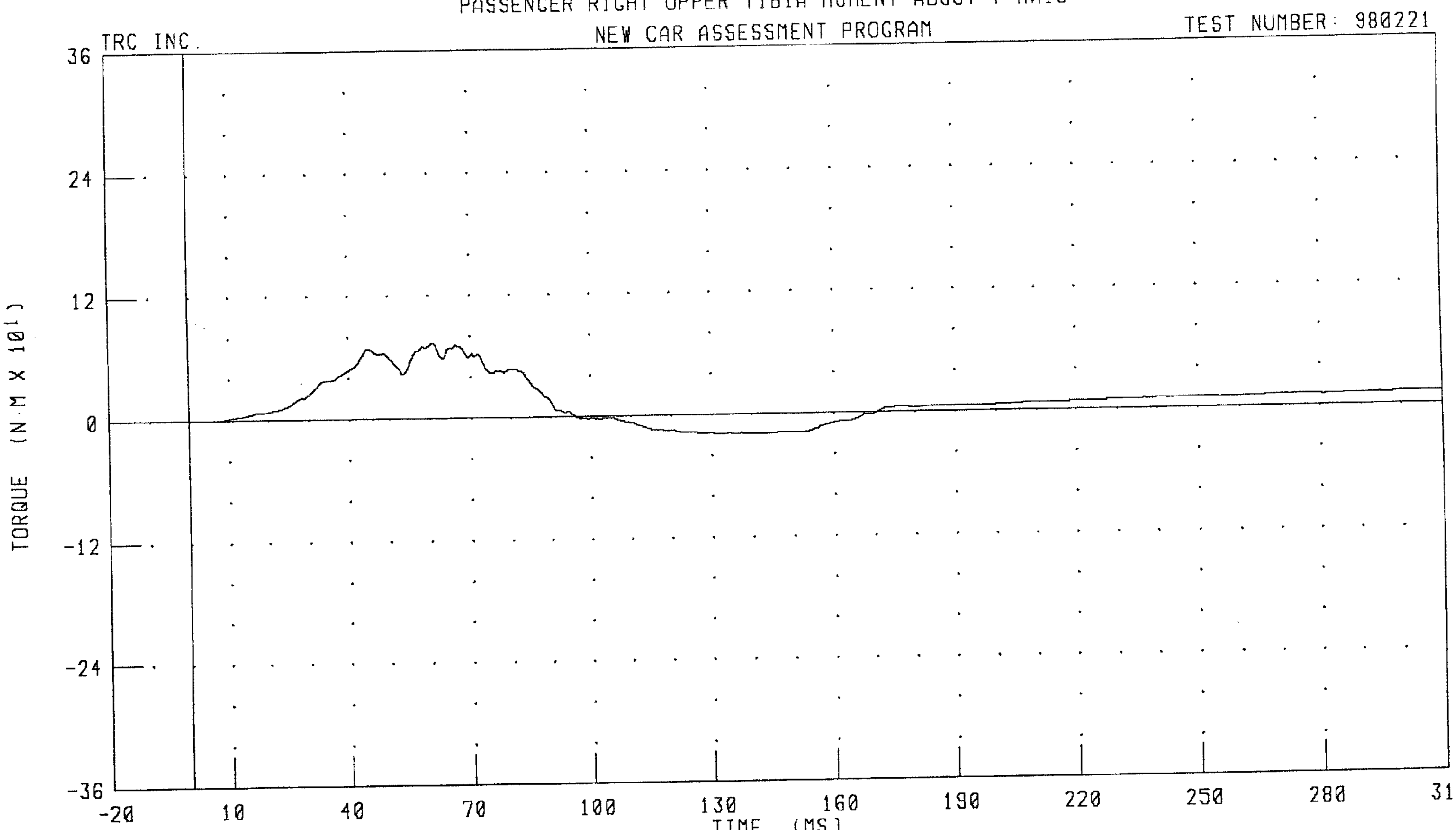
TEST NUMBER: 980221



CHANNEL: TBRXM2   FILTER: CH. CLASS 600

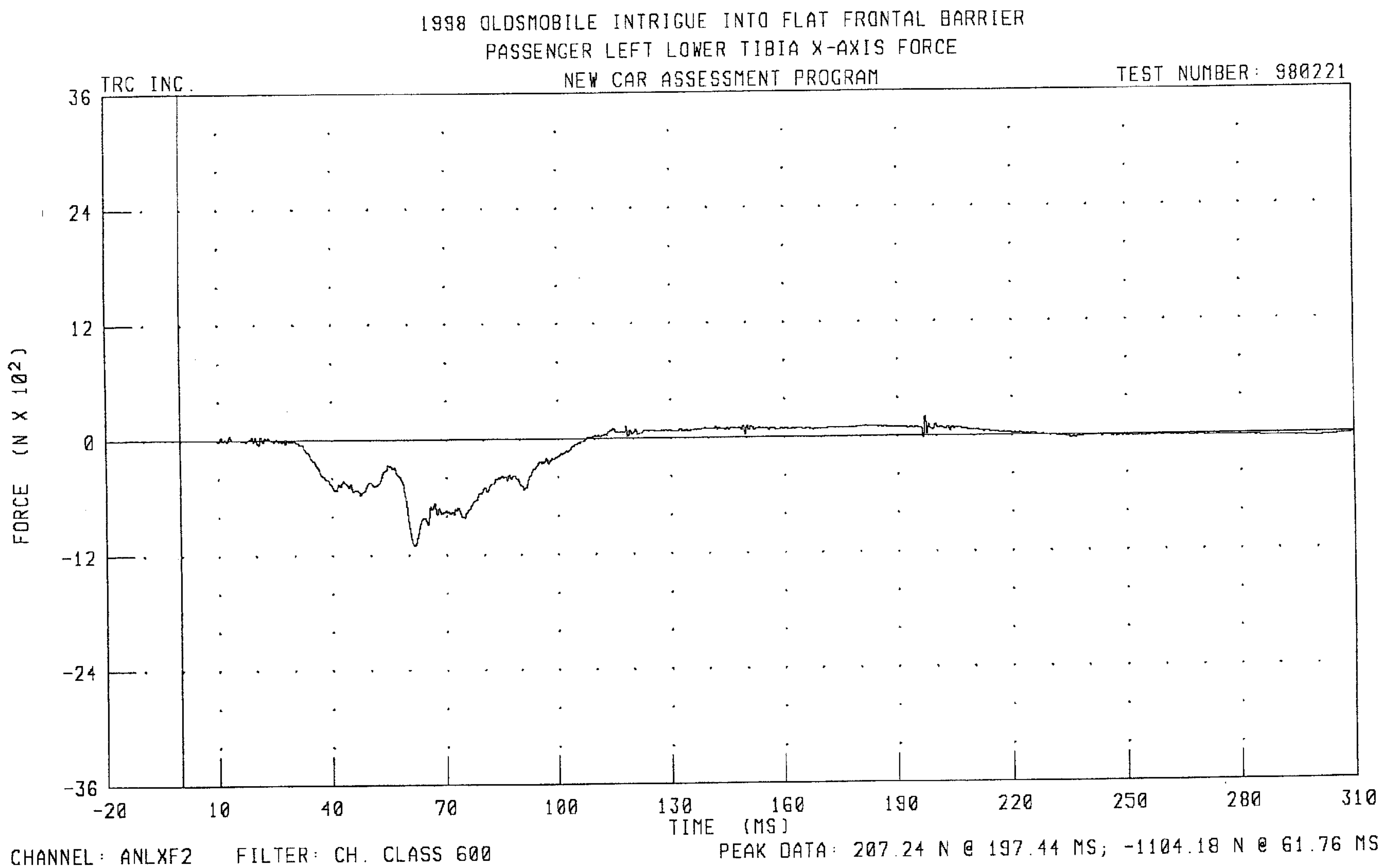
PEAK DATA: 49.03 N·M @ 85.20 MS; -10.05 N·M @ 194.24 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM



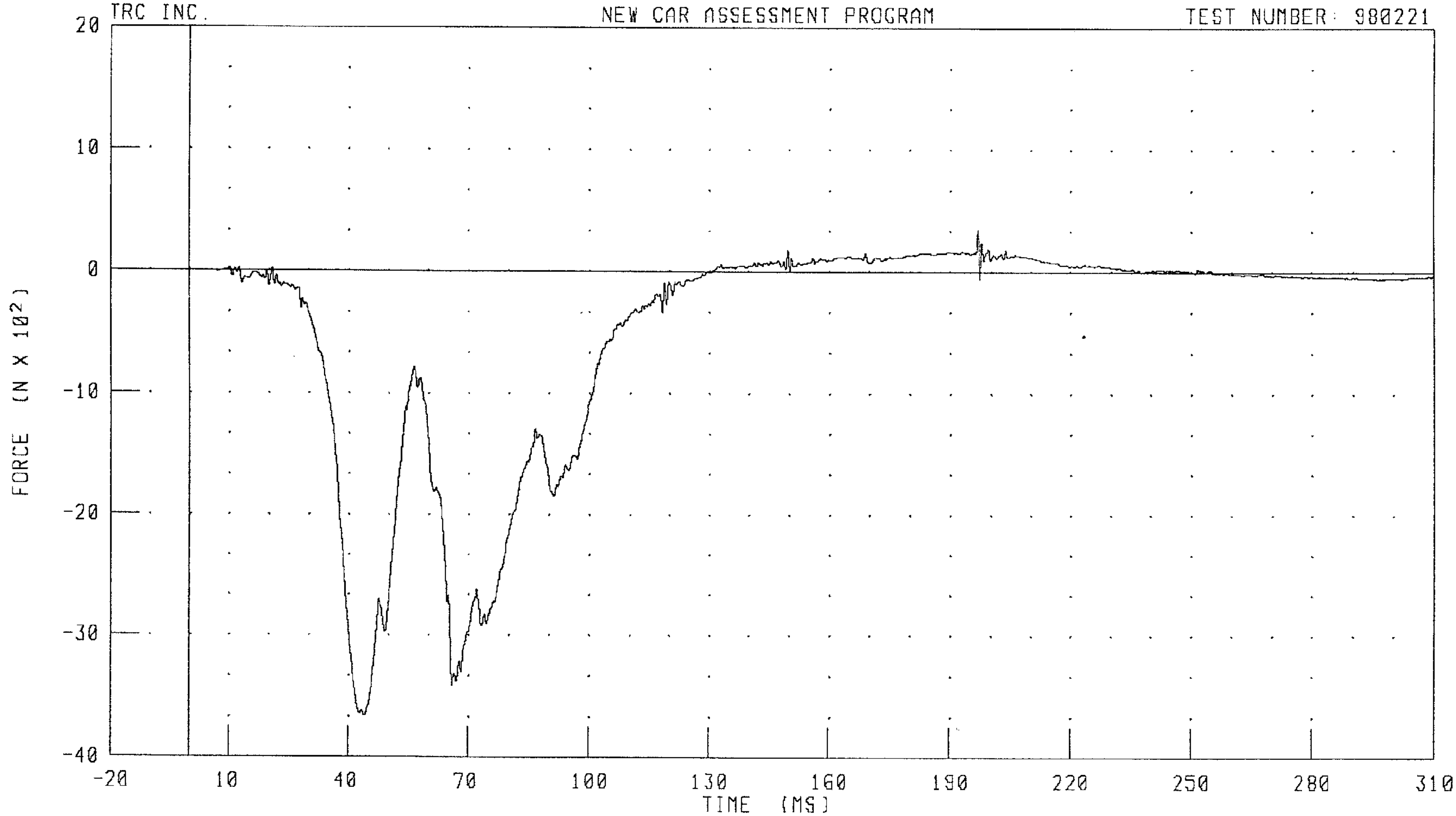
CHANNEL: TBRYM2 FILTER: CH. CLASS 600

PEAK DATA: 73.14 N·M @ 60.96 MS; -19.59 N·M @ 143.12 MS

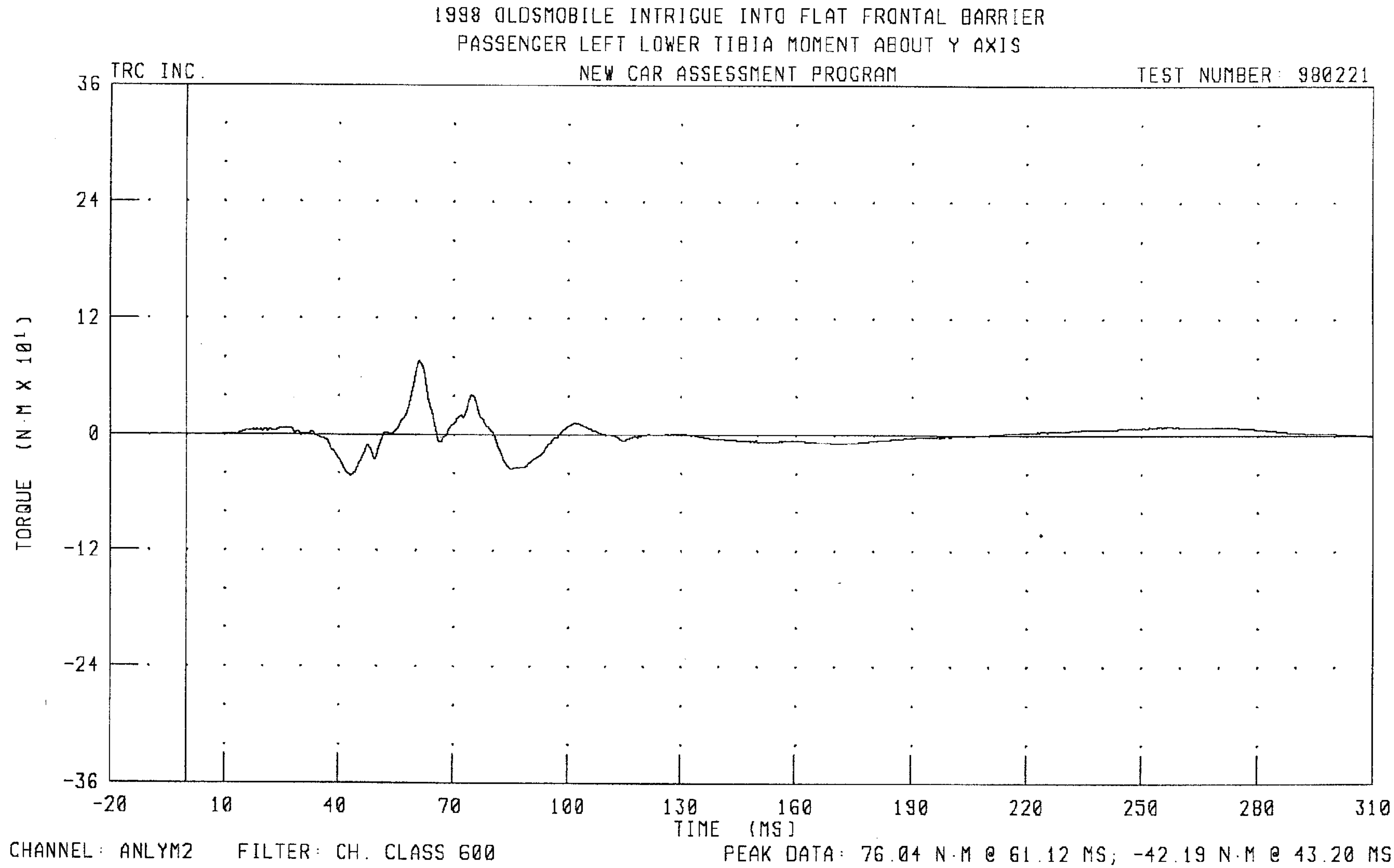

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT LOWER TIBIA X-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
FORCE (N X 10^2)
36
24
12
0
-12
-24
-36
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANLXF2
FILTER: CH. CLASS 600
PEAK DATA: 207.24 N @ 197.44 MS; -1104.18 N @ 61.76 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM

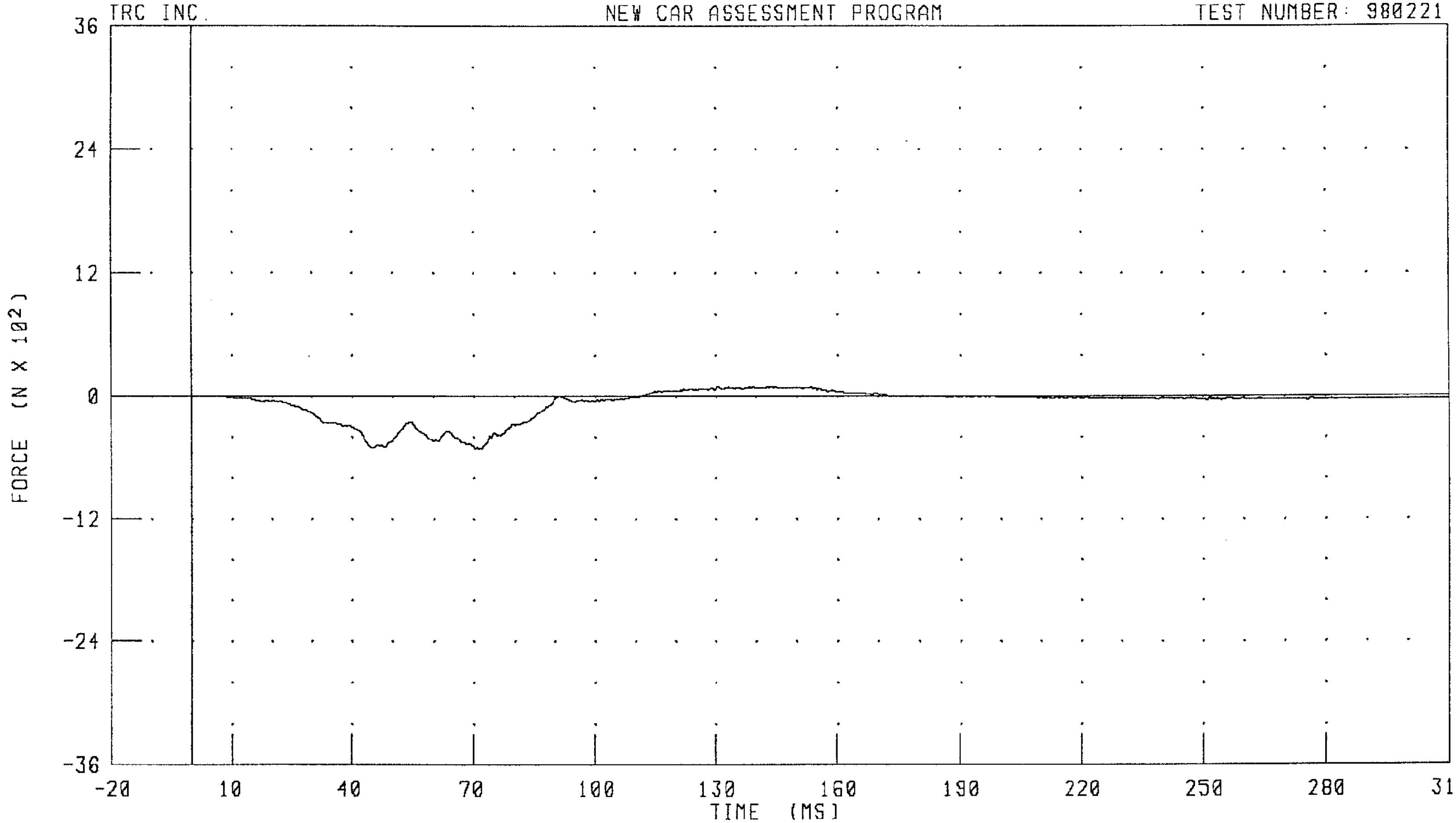
TRC INC. TEST NUMBER: 980221



CHANNEL: ANLZF2 FILTER: CH. CLASS 600 PEAK DATA: 345.03 N @ 196.96 MS; -3658.74 N @ 44.08 MS

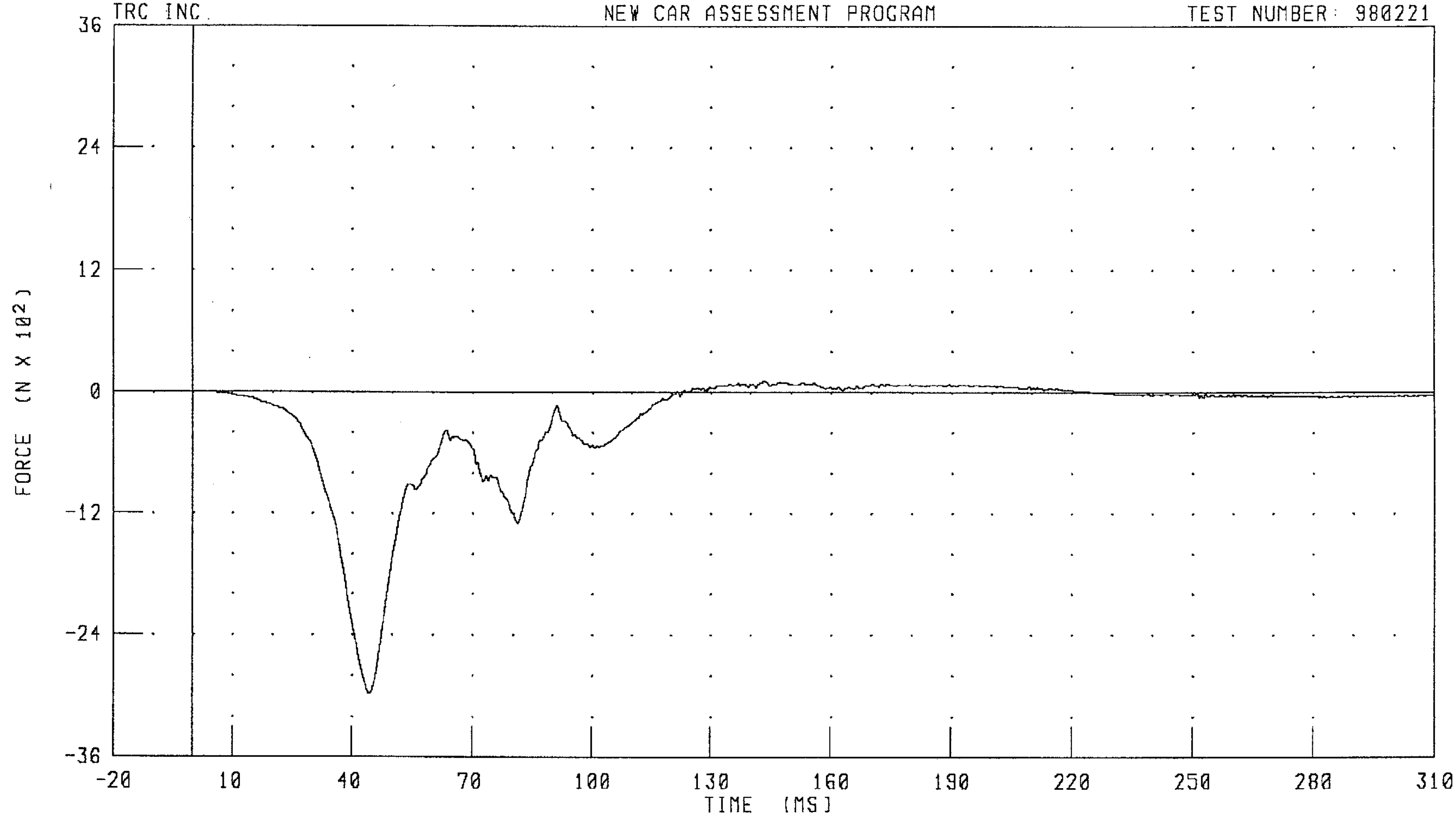

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
TORQUE (N·M X 10¹)
36
24
12
0
-12
-24
-36
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ANLYM2
FILTER: CH. CLASS 600
PEAK DATA: 76.04 N·M @ 61.12 MS; -42.19 N·M @ 43.20 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM



CHANNEL: ANRXF2   FILTER: CH. CLASS 600   PEAK DATA: 92.49 N @ 143.92 MS; -515.48 N @ 71.36 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE
NEW CAR ASSESSMENT PROGRAM

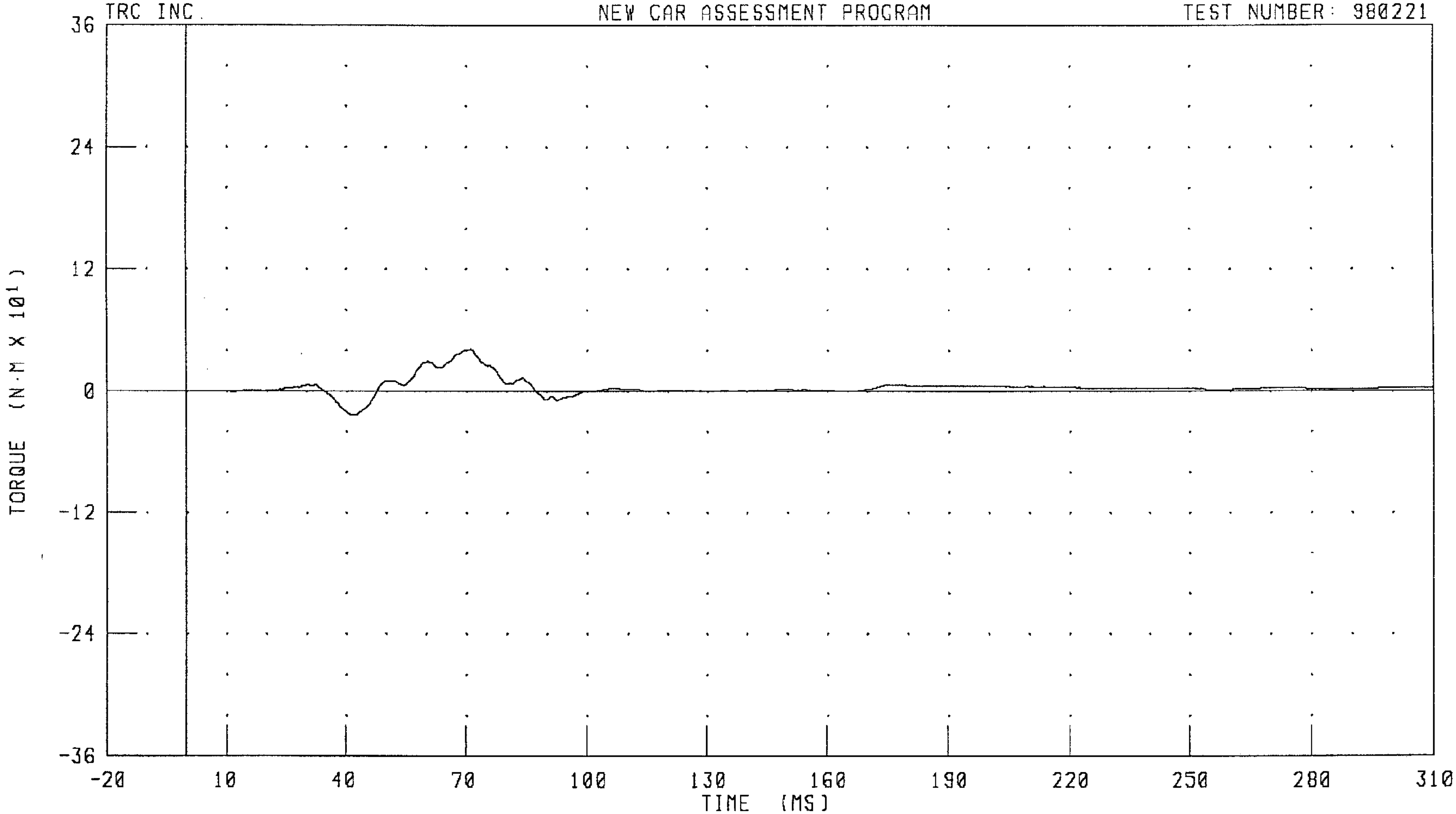


CHANNEL: ANRZF2 FILTER: CH. CLASS 600 PEAK DATA: 112.45 N @ 143.52 MS; -2980.13 N @ 44.48 MS

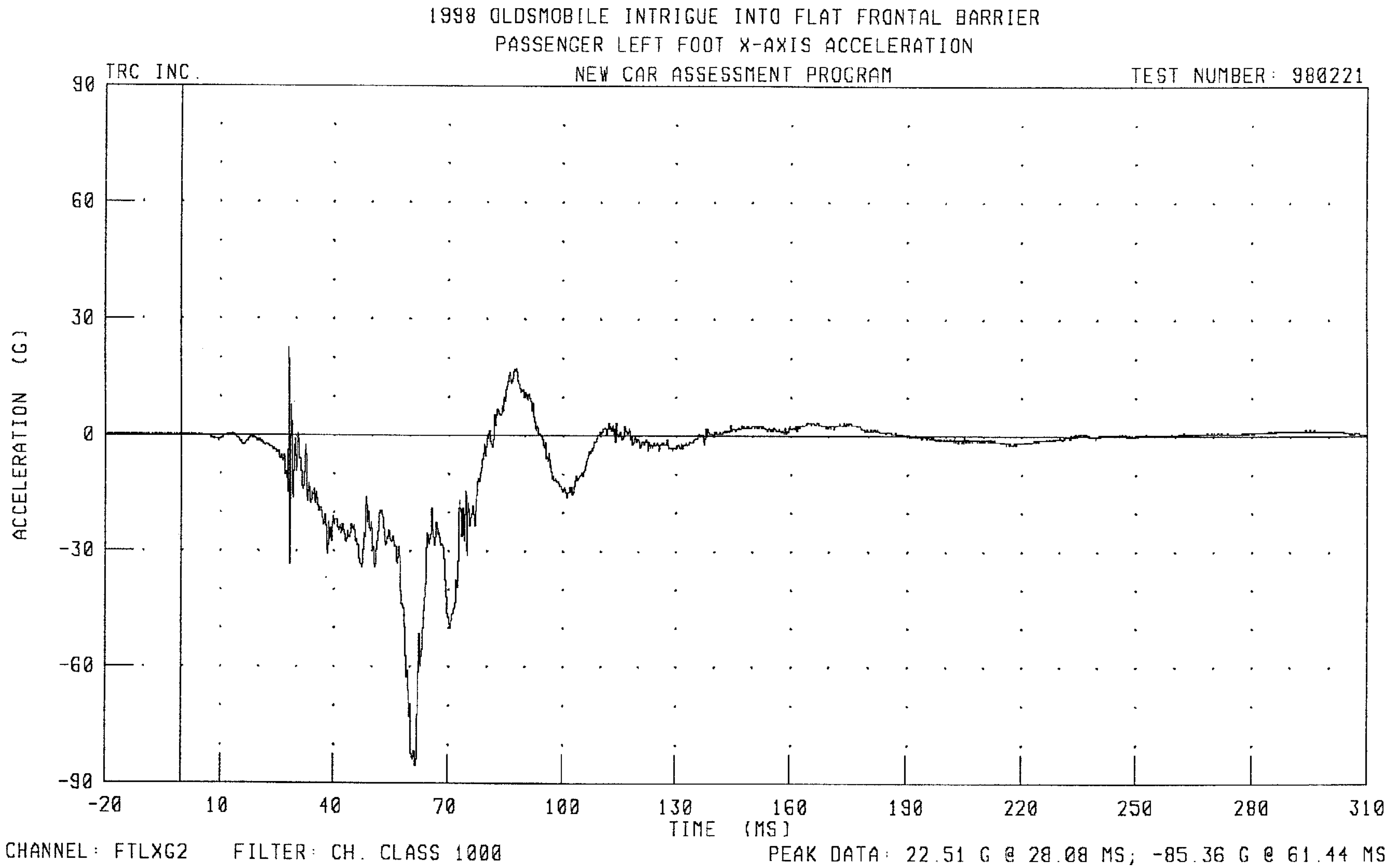
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM

TRC INC.

TEST NUMBER: 980221

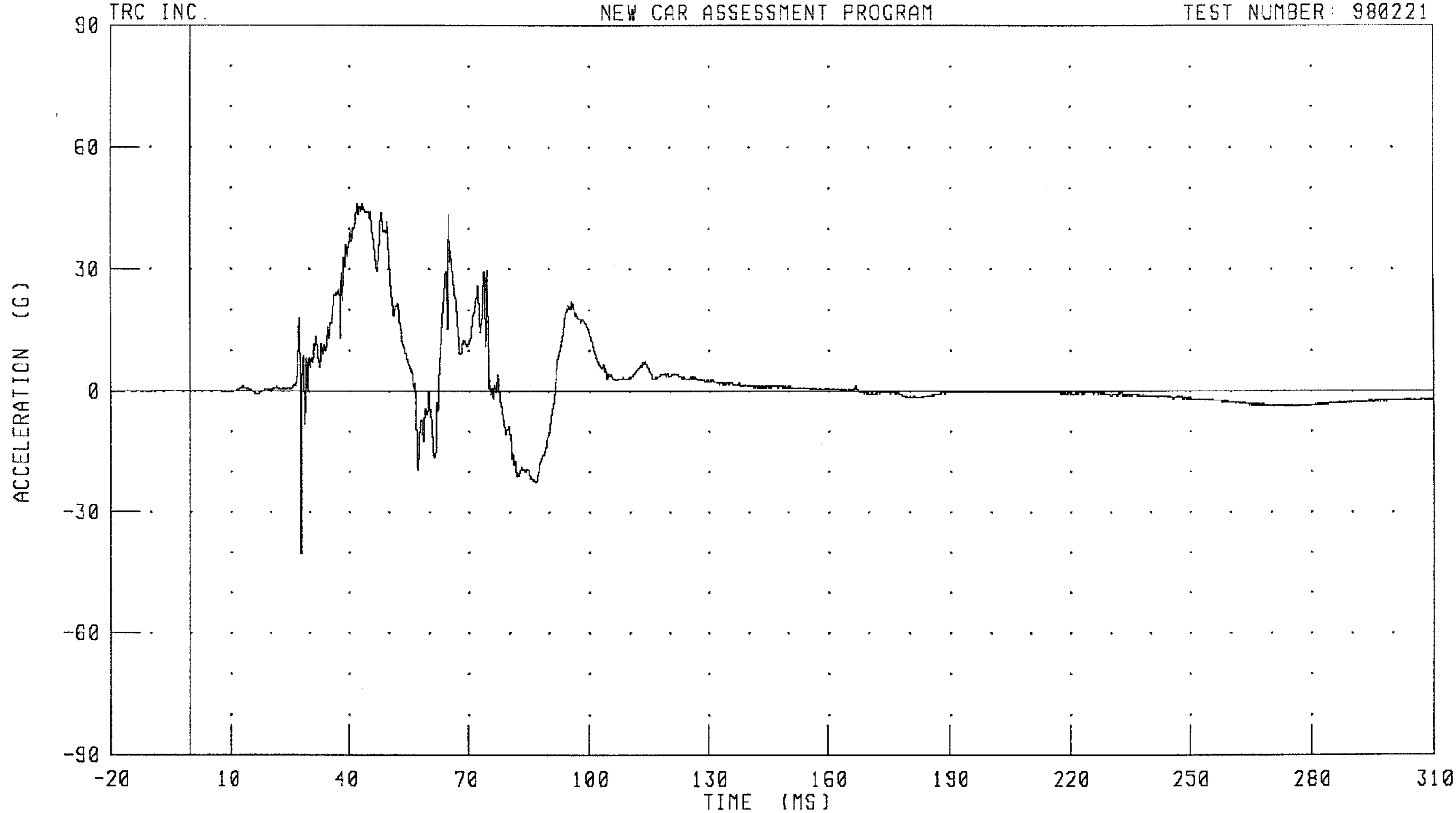


CHANNEL: ANRYM2 FILTER: CH. CLASS 600 PEAK DATA: 41.20 N·M @ 71.20 MS; -23.69 N·M @ 41.92 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT FOOT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLXG2
FILTER: CH. CLASS 1000
PEAK DATA: 22.51 G @ 28.08 MS; -85.36 G @ 61.44 MS

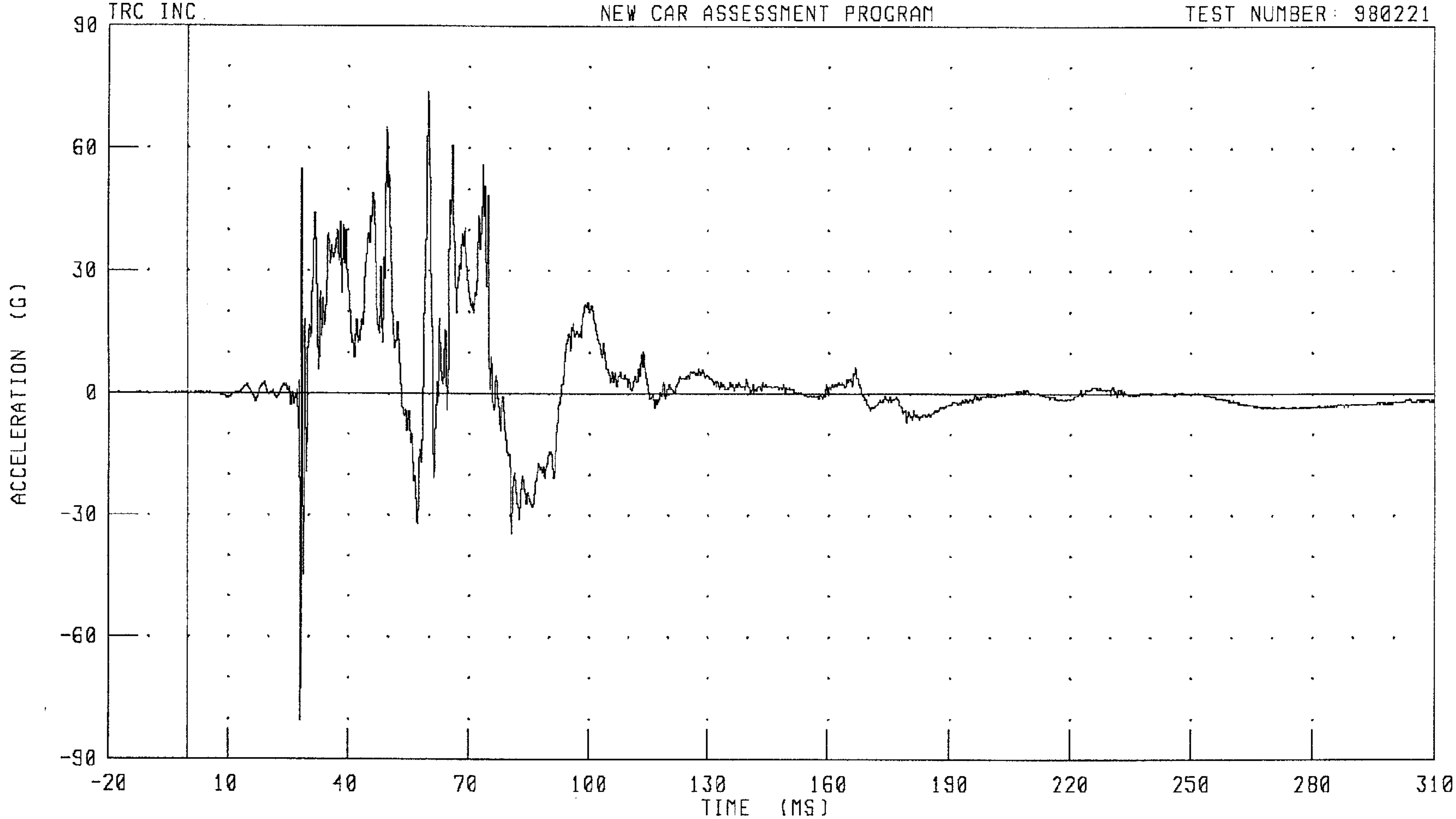
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT FOOT Z-AXIS ACCELERATION AT HEEL
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221



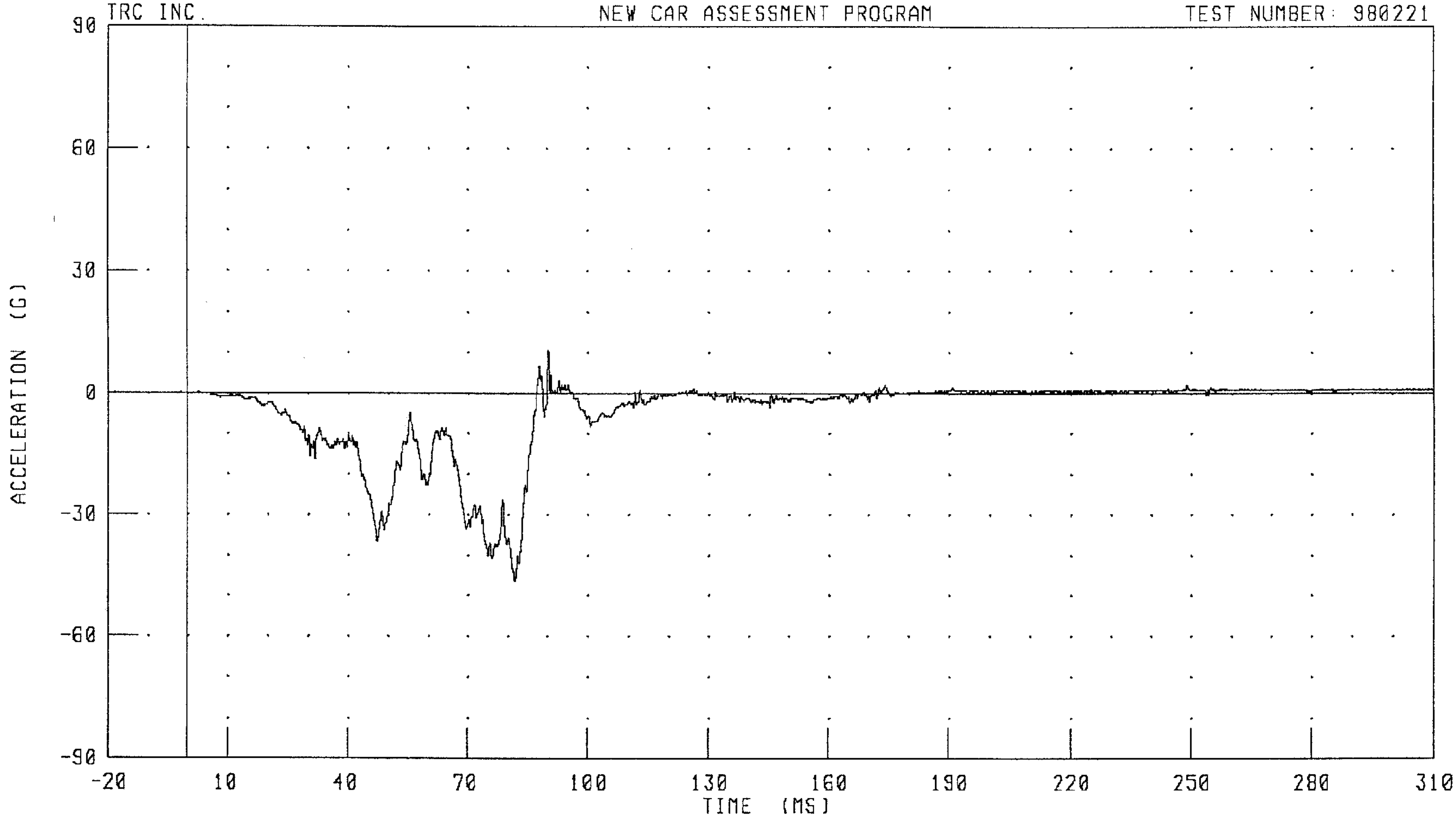
CHANNEL: FTLZH2 FILTER: CH. CLASS 1000 PEAK DATA: 45.90 G @ 42.08 MS; -40.33 G @ 27.92 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LEFT FOOT Z-AXIS ACCELERATION AT TOE
NEW CAR ASSESSMENT PROGRAM



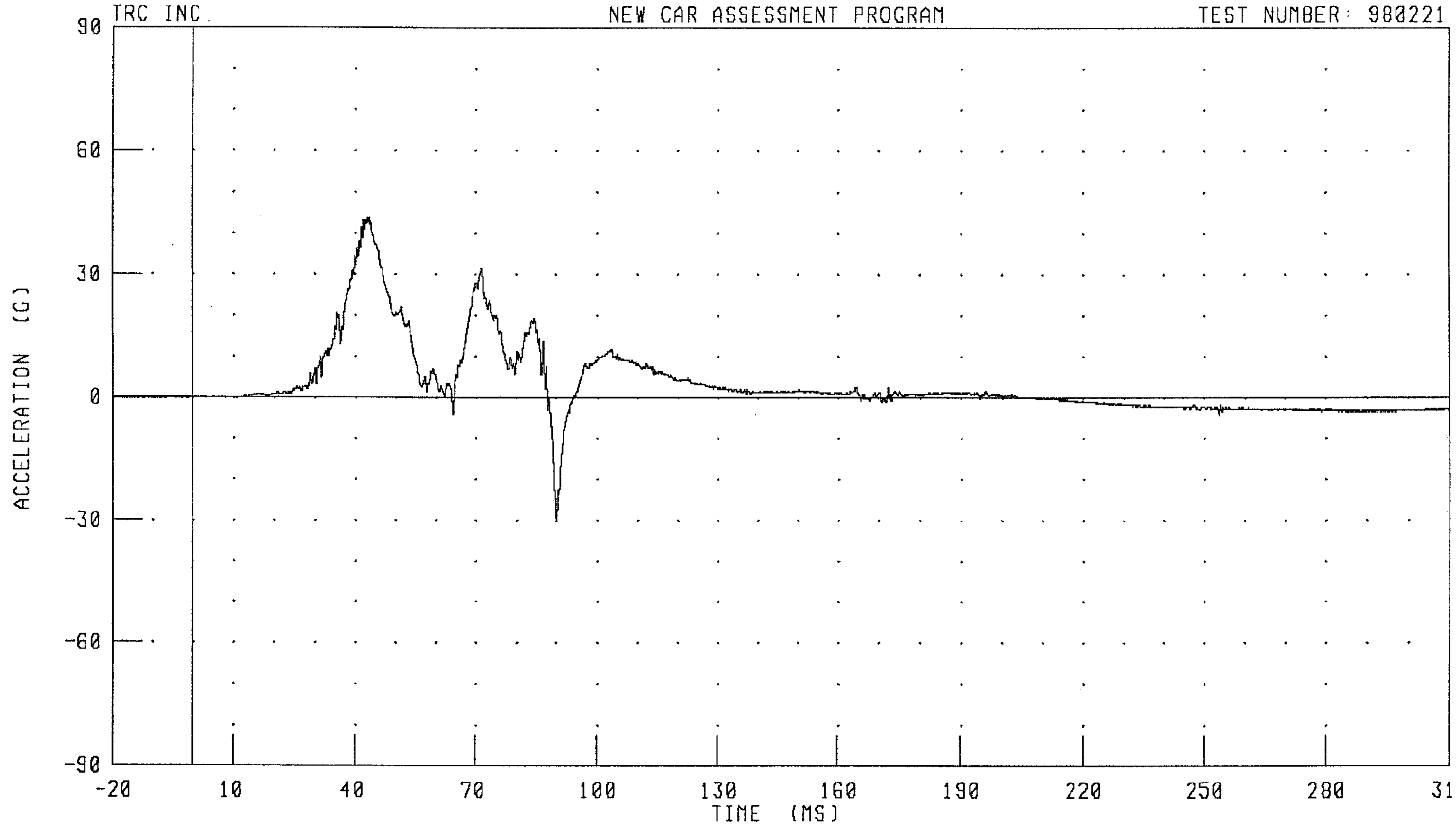
CHANNEL: FTLZT2 FILTER: CH. CLASS 1000 PEAK DATA: 74.00 G @ 59.84 MS; -80.38 G @ 28.08 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT FOOT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



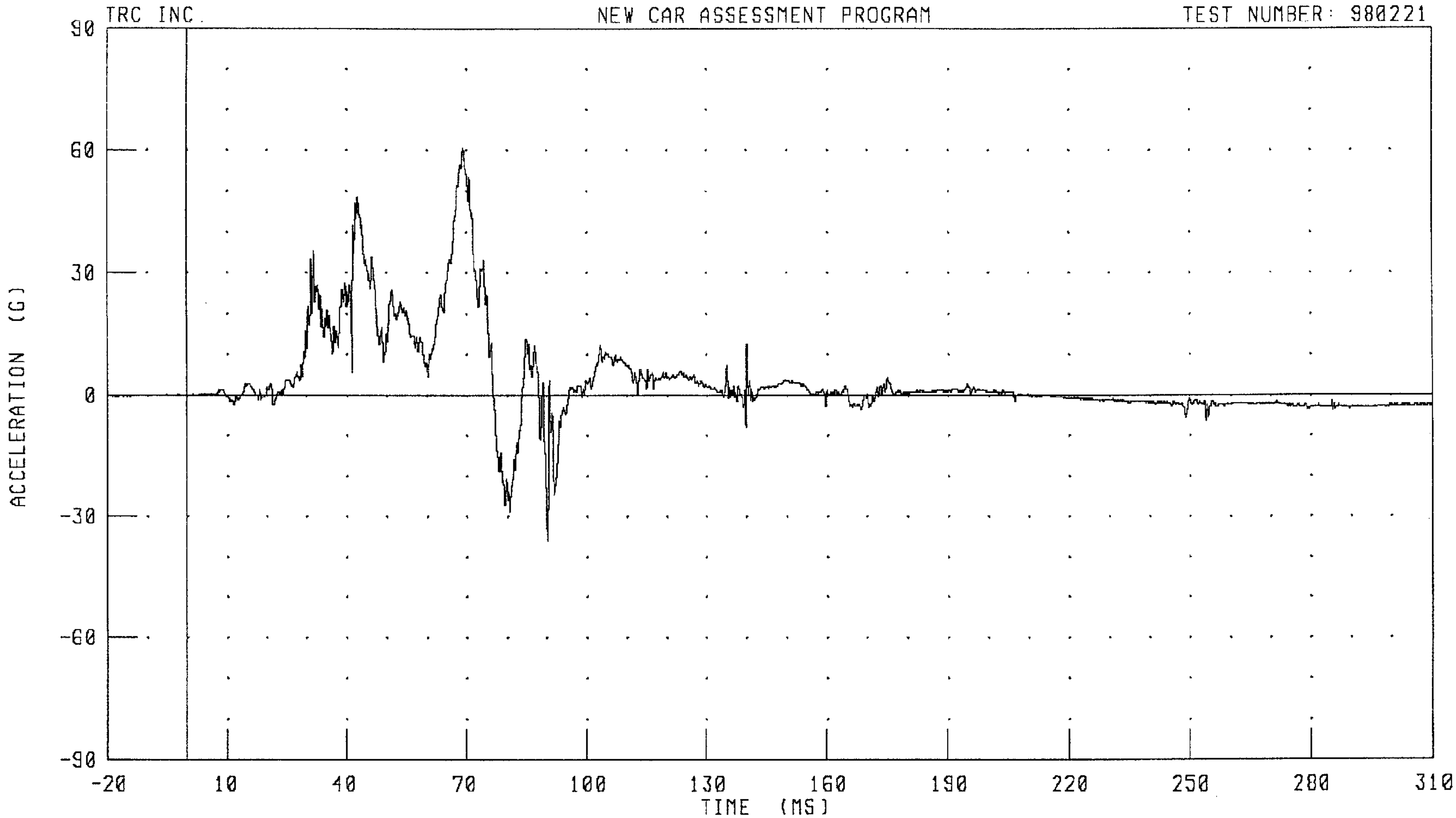
CHANNEL: FTRXG2 FILTER: CH. CLASS 1000 PEAK DATA: 10.60 G @ 90.32 MS; -46.49 G @ 81.84 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT FOOT Z-AXIS ACCELERATION AT HEEL
NEW CAR ASSESSMENT PROGRAM



CHANNEL: FTRZH2 FILTER: CH. CLASS 1000 PEAK DATA: 43.68 G @ 42.96 MS; -30.16 G @ 90.24 MS

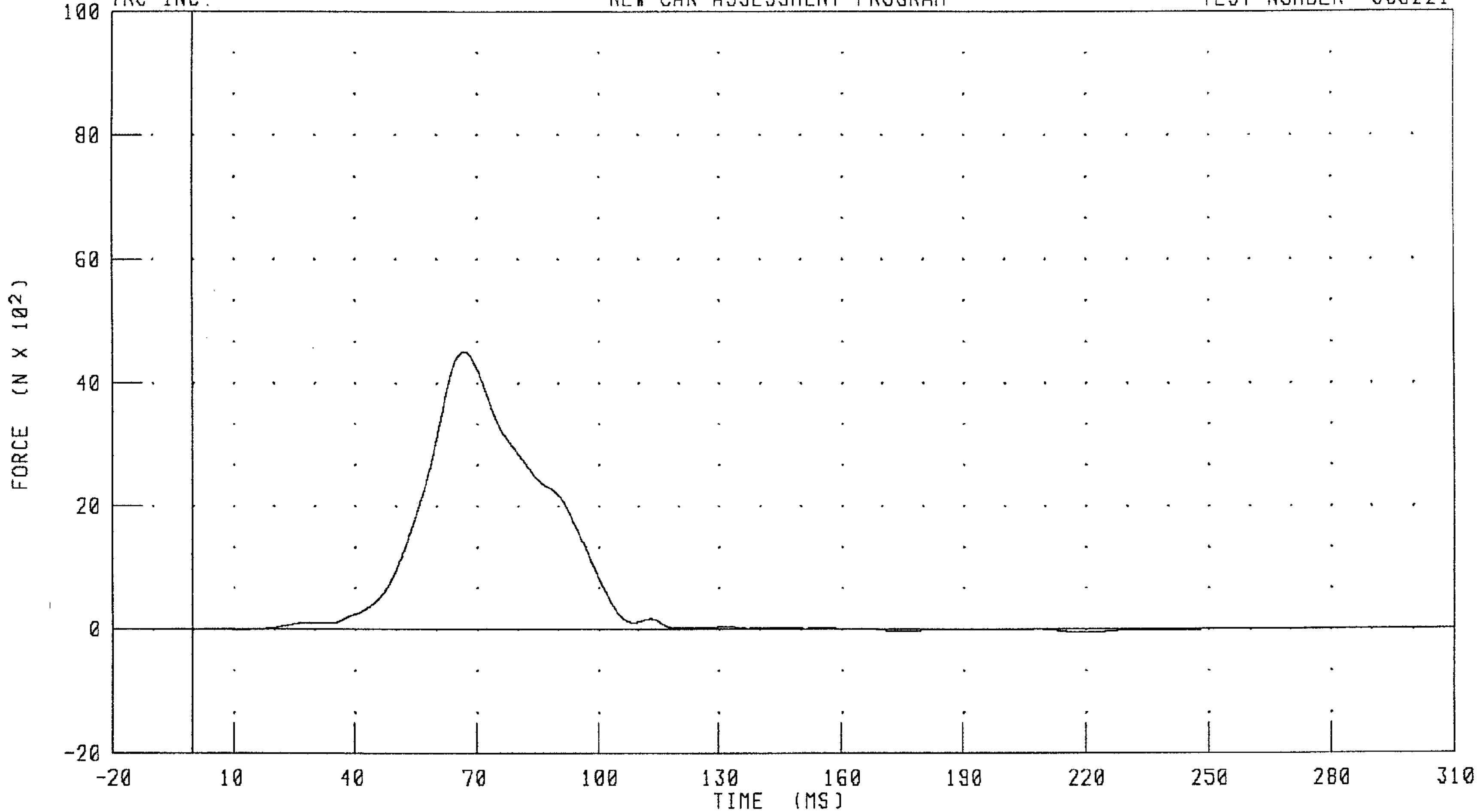
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER RIGHT FOOT Z-AXIS ACCELERATION AT TOE
NEW CAR ASSESSMENT PROGRAM



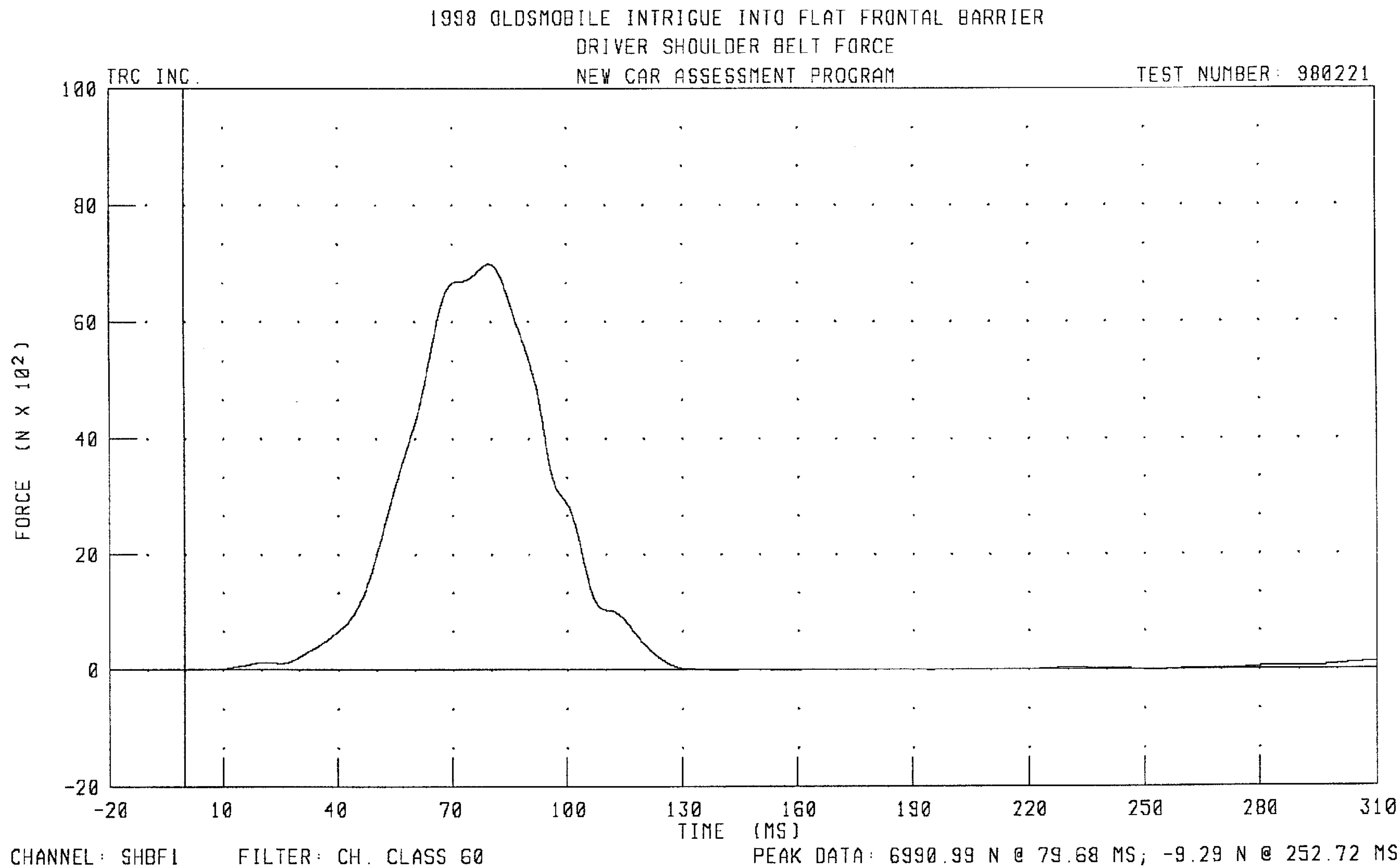
CHANNEL: FTRZT2 FILTER: CH. CLASS 1000 PEAK DATA: 60.42 G @ 69.12 MS; -36.09 G @ 90.24 MS

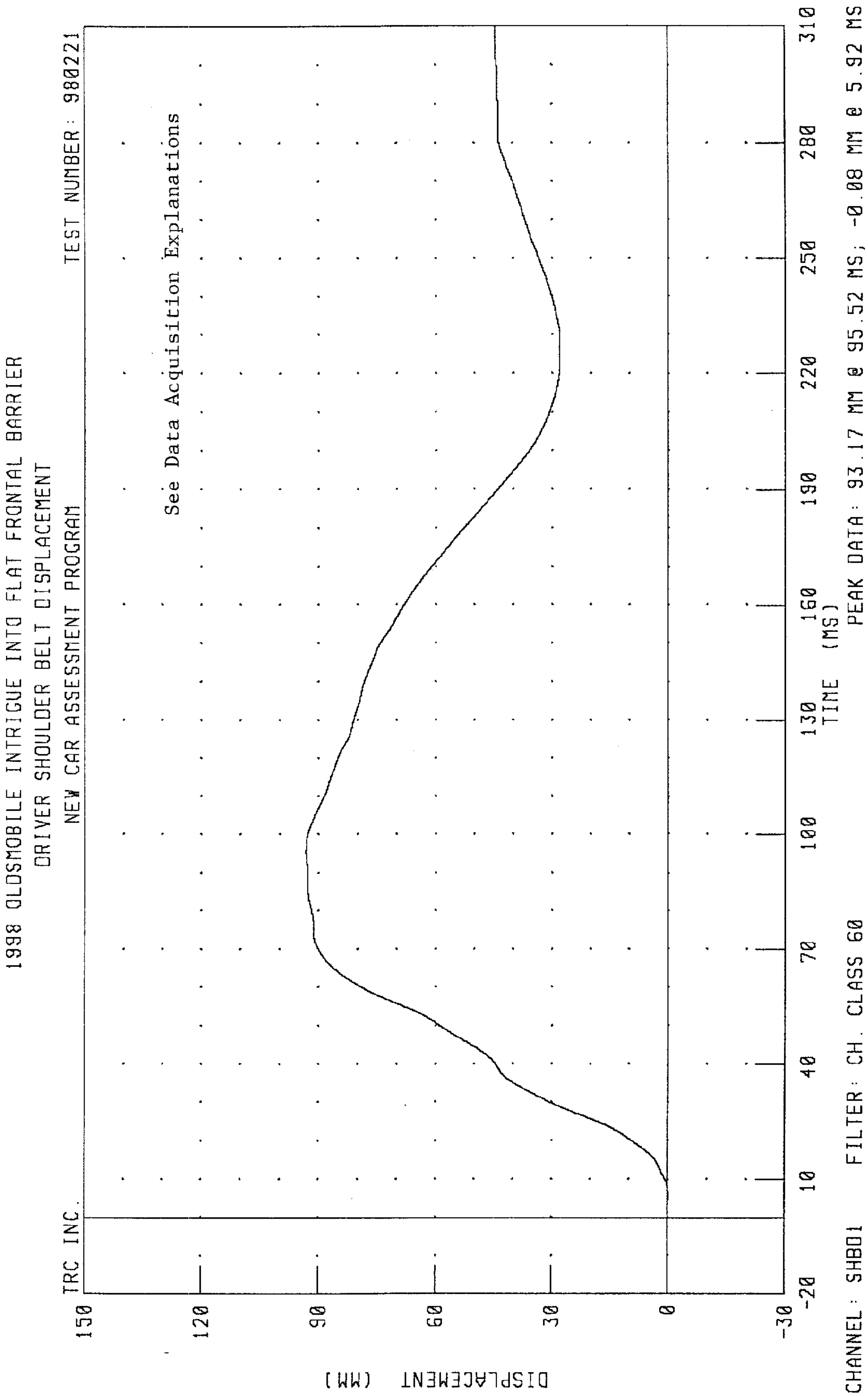
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER LAP BELT OUTBOARD FORCE
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221



CHANNEL: LBOFI FILTER: CH. CLASS 60 PEAK DATA: 4501.81 N @ 66.88 MS; -53.31 N @ 220.56 MS

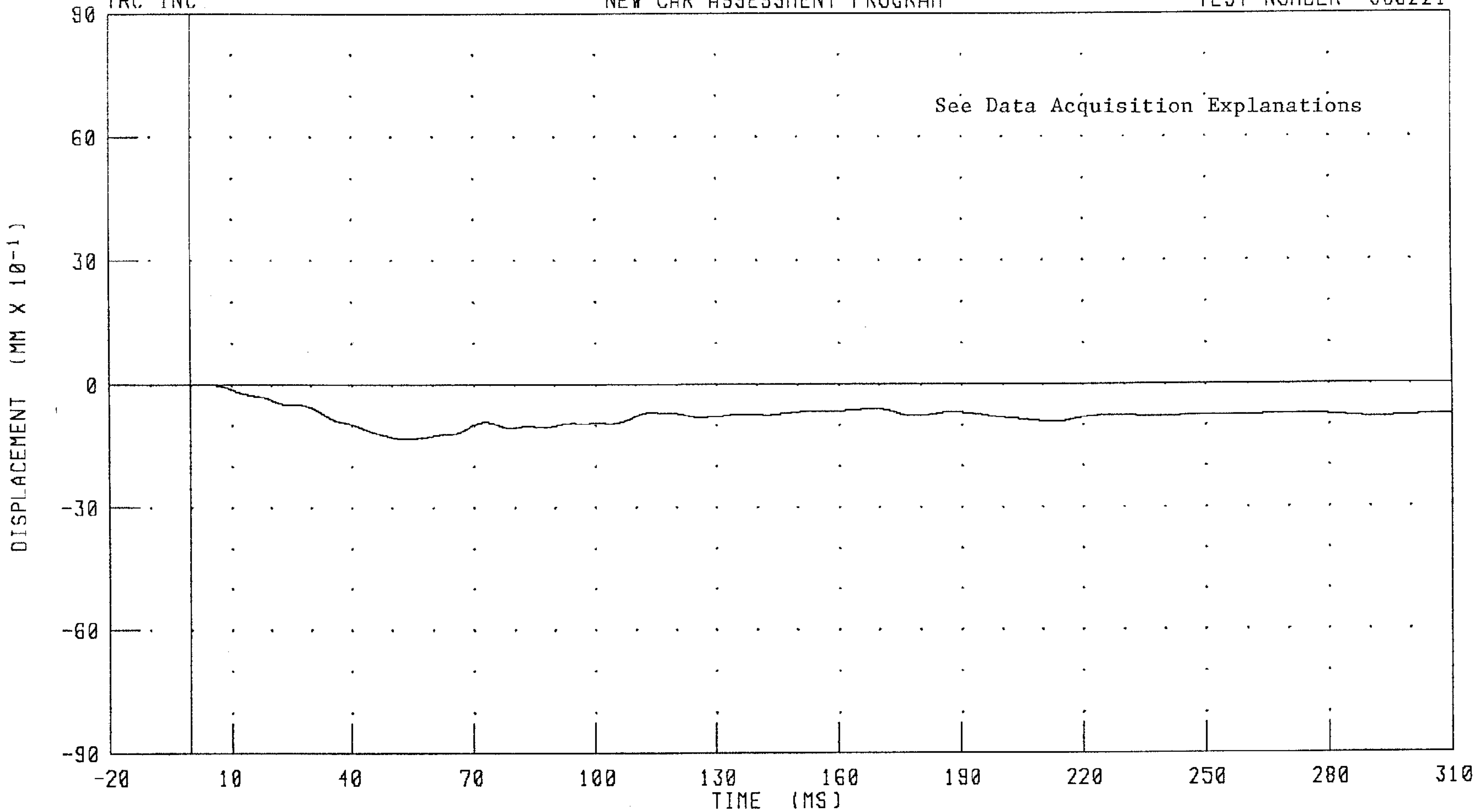

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER SHOULDER BELT FORCE
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
FORCE (N X 10^2)
100
80
60
40
20
0
-20
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SHBF1
FILTER: CH. CLASS 60
PEAK DATA: 6990.99 N @ 79.68 MS; -9.29 N @ 252.72 MS


1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
See Data Acquisition Explanations
DISPLACEMENT (MM)
150
120
90
60
30
0
-30
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SHB01
FILTER: CH. CLASS 60
PEAK DATA: 93.17 MM @ 95.52 MS; -0.08 MM @ 5.92 MS

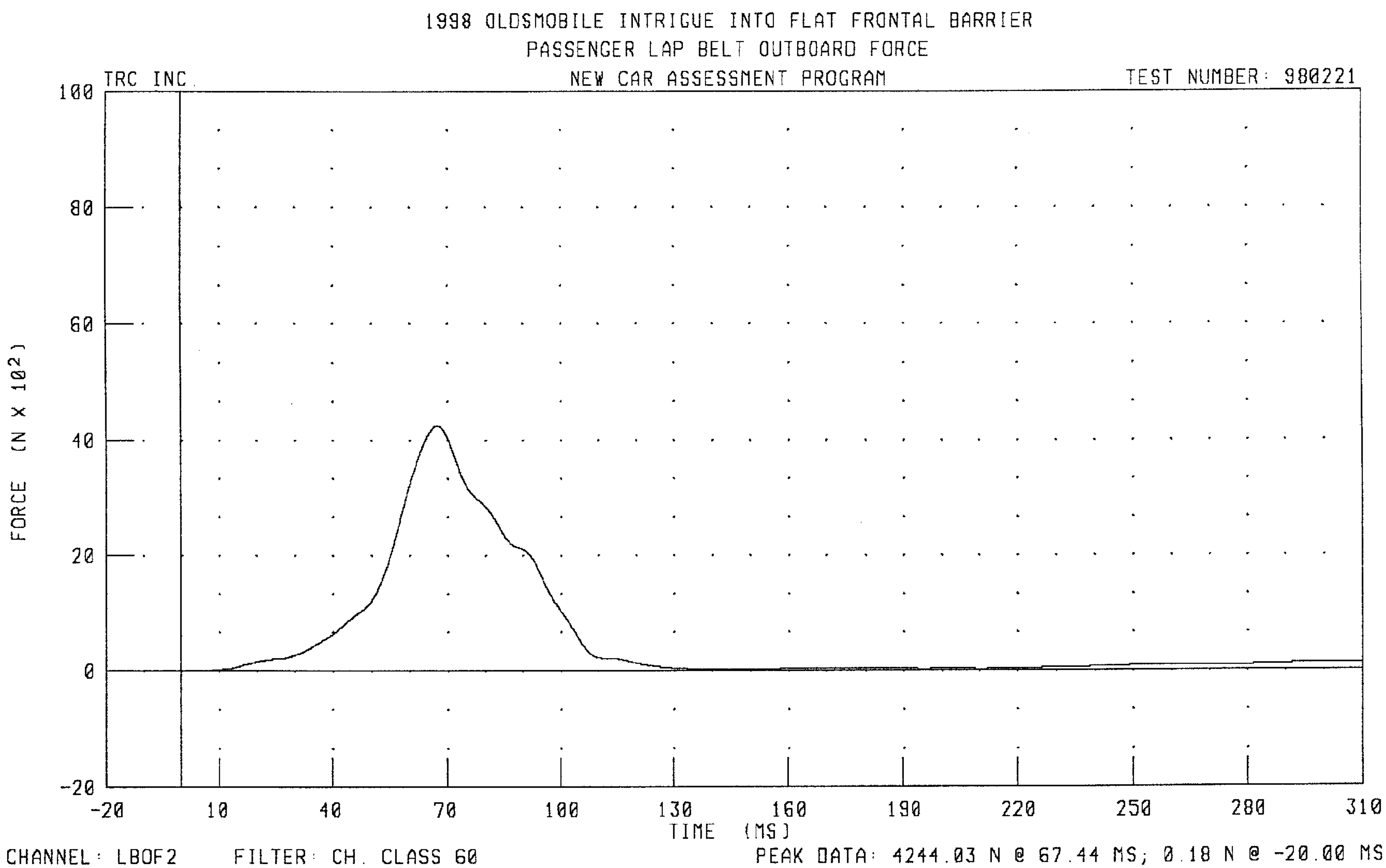
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
DRIVER SEAT BELT EXTENSION
NEW CAR ASSESSMENT PROGRAM

TRC INC

TEST NUMBER: 980221

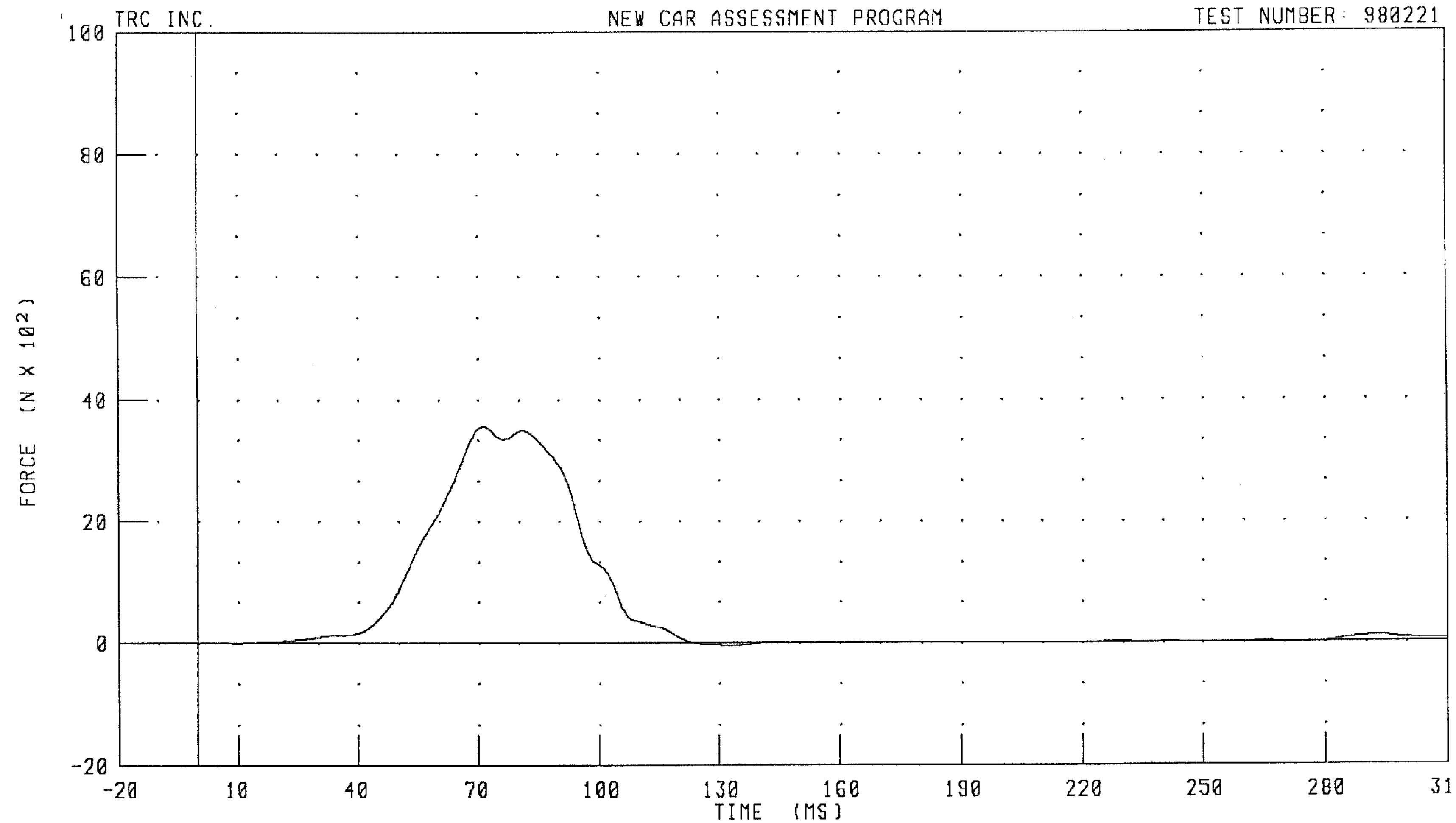


CHANNEL: SBED1 FILTER: CH. CLASS 60 PEAK DATA: 0.00 MM @ -20.00 MS; -1.33 MM @ 53.76 MS

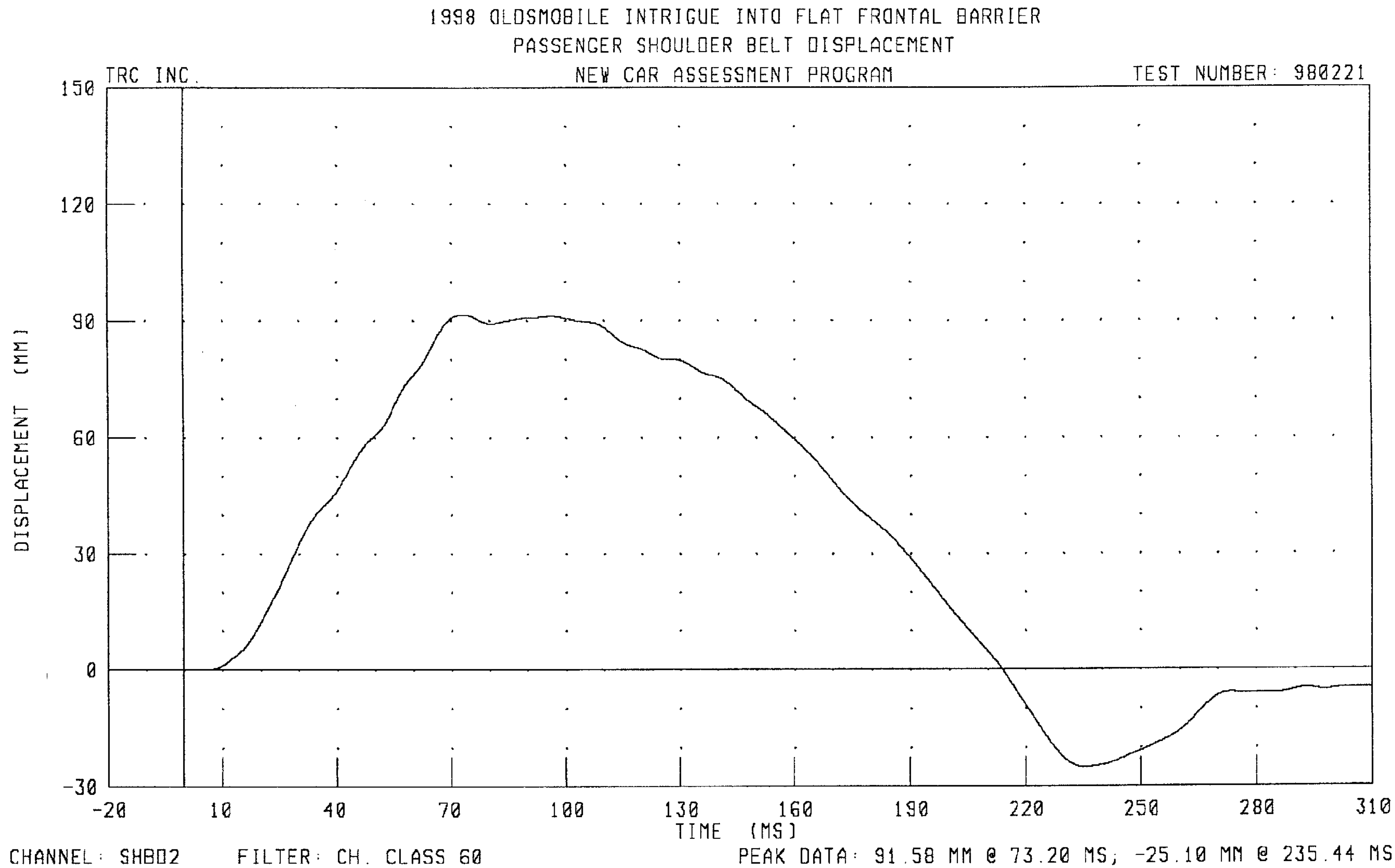

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
FORCE (N X 10²)
100
80
60
40
20
0
-20
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LBOF2
FILTER: CH. CLASS 60
PEAK DATA: 4244.03 N @ 67.44 MS; 0.18 N @ -20.00 MS

980221

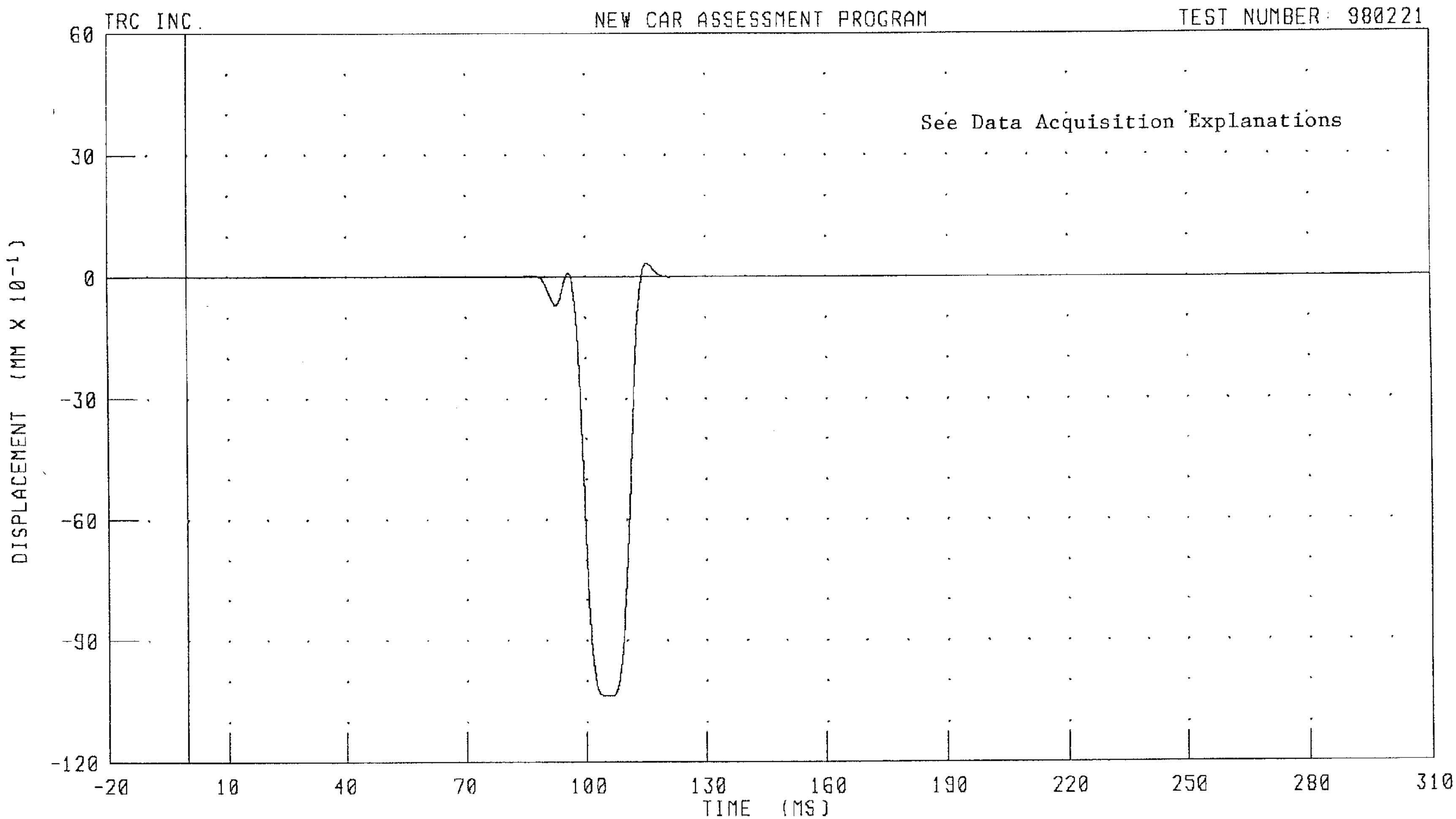
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER SHOULDER BELT FORCE
NEW CAR ASSESSMENT PROGRAM



CHANNEL: SHBF2 FILTER: CH. CLASS 60 PEAK DATA: 3563.87 N @ 71.28 MS; -45.69 N @ 133.04 MS

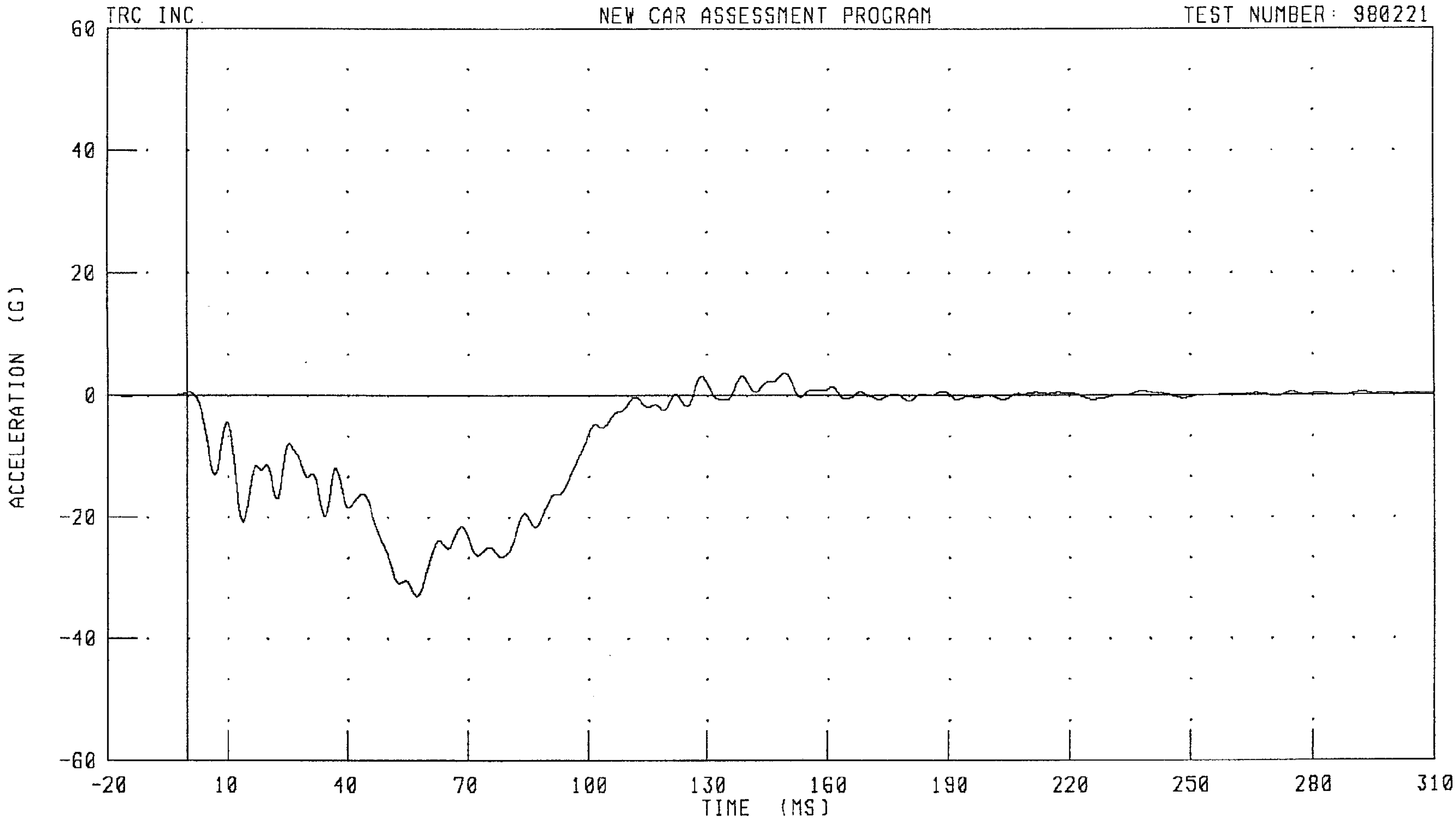

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
150
120
90
60
30
0
-30
DISPLACEMENT (MM)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SHB02
FILTER: CH. CLASS 60
PEAK DATA: 91.58 MM @ 73.20 MS; -25.10 MM @ 235.44 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
PASSENGER SEAT BELT EXTENSION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: SBED2 FILTER: CH. CLASS 60 PEAK DATA: 0.33 MM @ 115.36 MS; -10.36 MM @ 104.40 MS

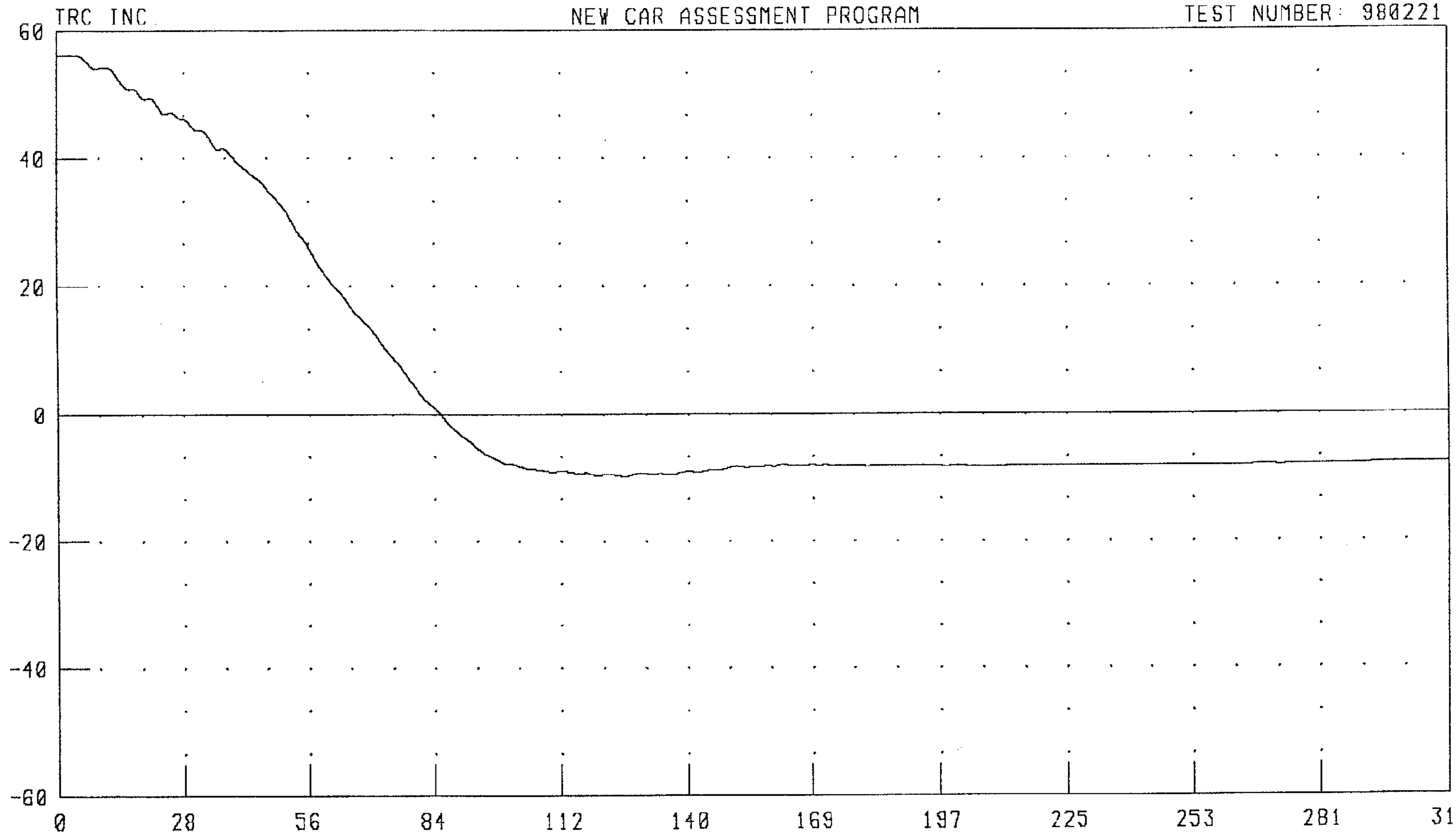
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: TLRXG1   FILTER: CH. CLASS 60   PEAK DATA: 3.62 G @ 149.60 MS; -33.01 G @ 57.20 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS VELOCITY
NEW CAR ASSESSMENT PROGRAM

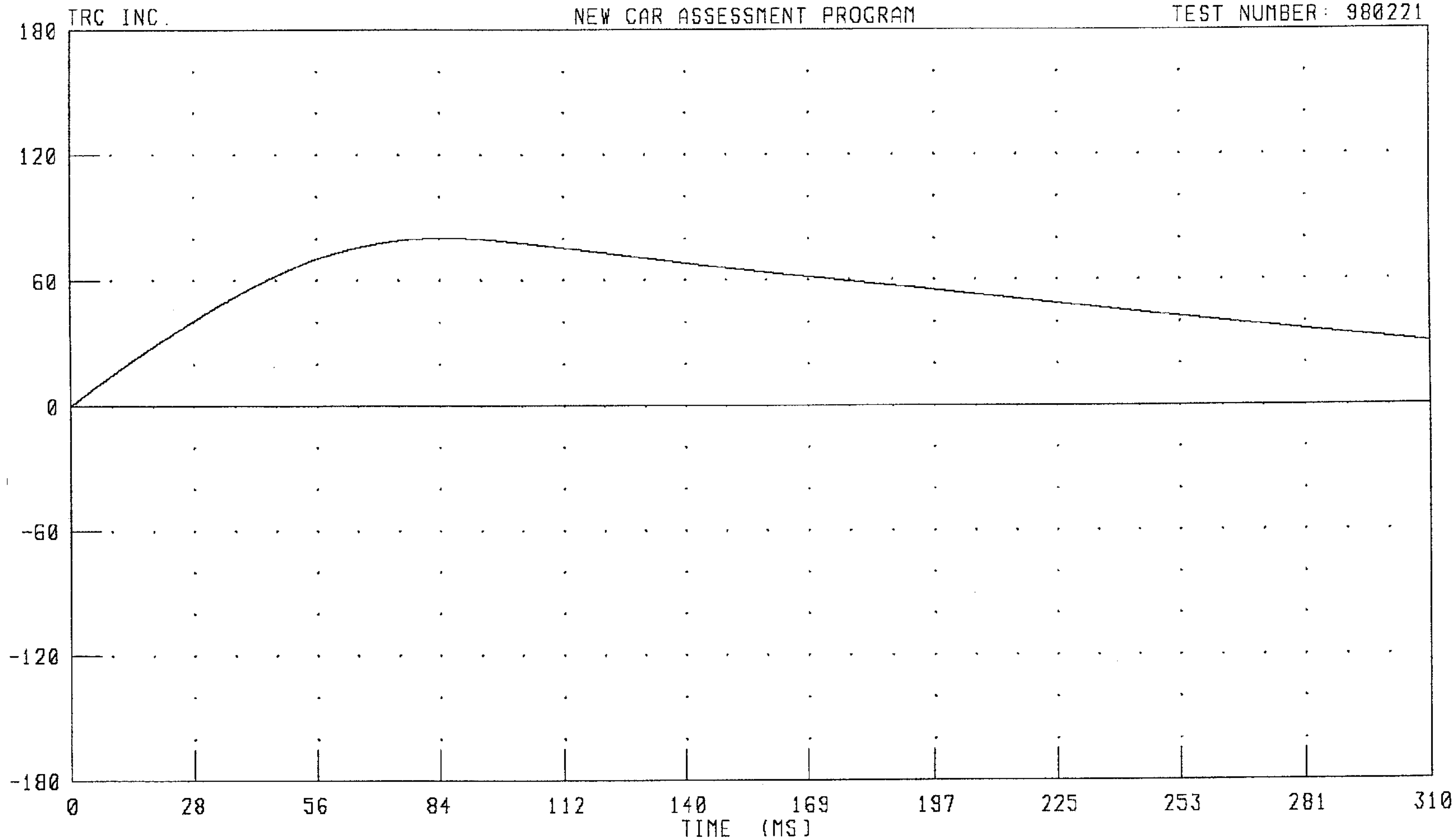
TRC INC. TEST NUMBER: 980221



CHANNEL: TLRXV1 FILTER: CH. CLASS 180

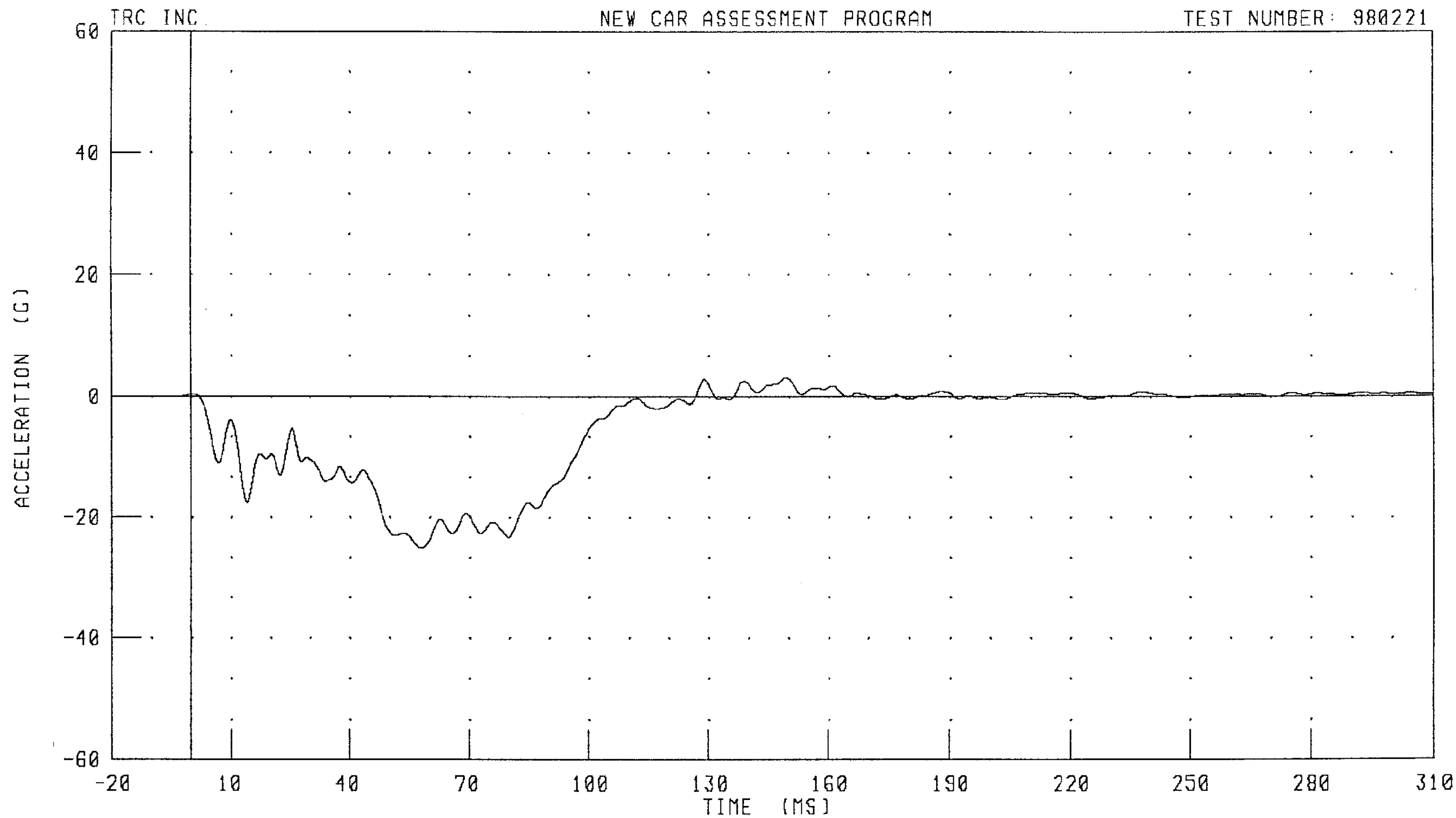
PEAK DATA: 56.10 KM/H @ 0.80 MS; -9.84 KM/H @ 126.88 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS DISPLACEMENT
NEW CAR ASSESSMENT PROGRAM



CHANNEL: TLRXD1 FILTER: CH. CLASS 180 PEAK DATA: 802.76 MM @ 86.00 MS; 0.00 MM @ 0.00 MS

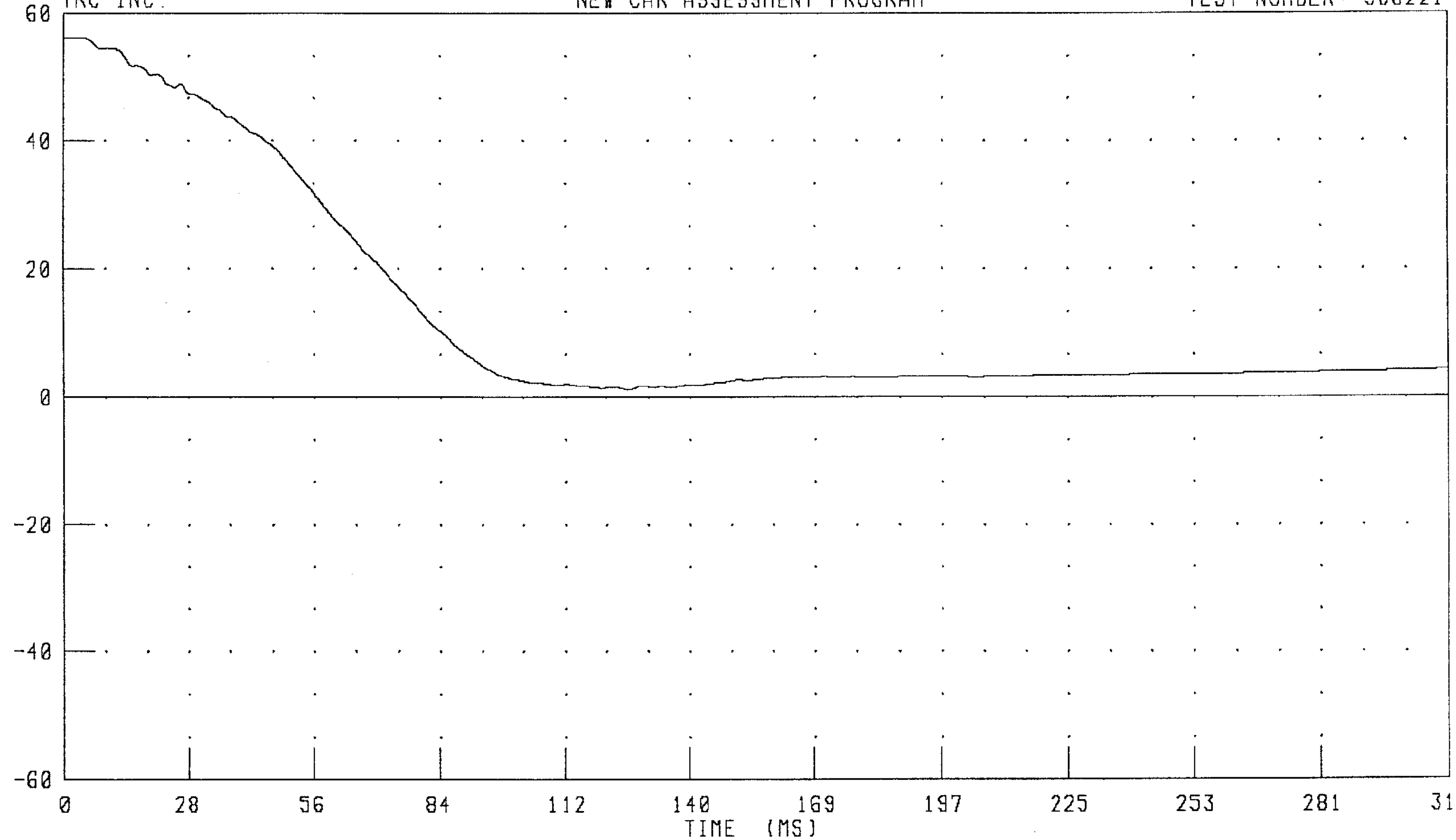
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: TRRXG1   FILTER: CH. CLASS 60   PEAK DATA: 3.11 G @ 149.36 MS; -25.11 G @ 57.84 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS VELOCITY
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221

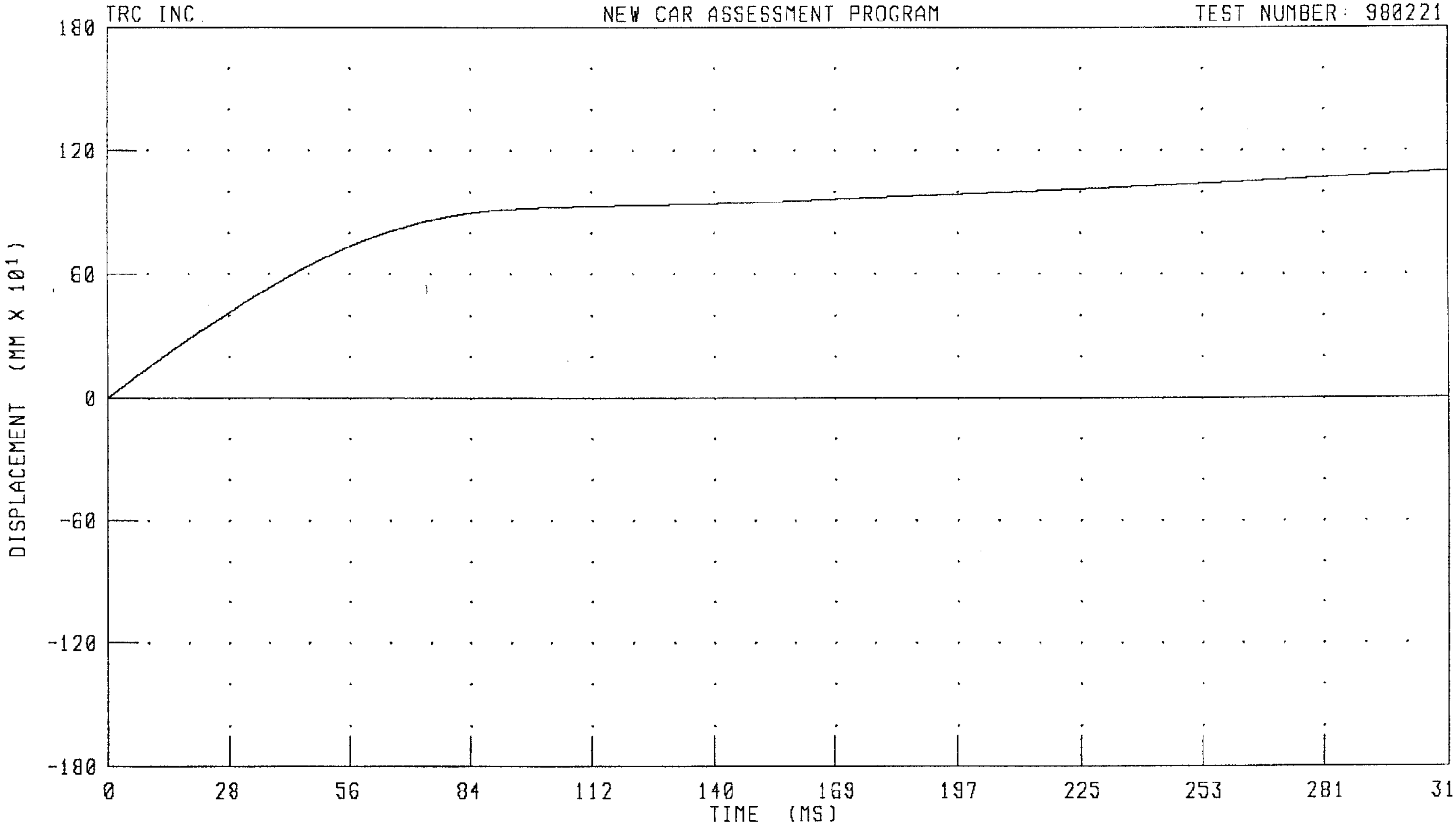


CHANNEL: TRRXV1 FILTER: CH. CLASS 180 PEAK DATA: 56.10 KM/H @ 0.08 MS; 1.22 KM/H @ 127.60 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS DISPLACEMENT
NEW CAR ASSESSMENT PROGRAM

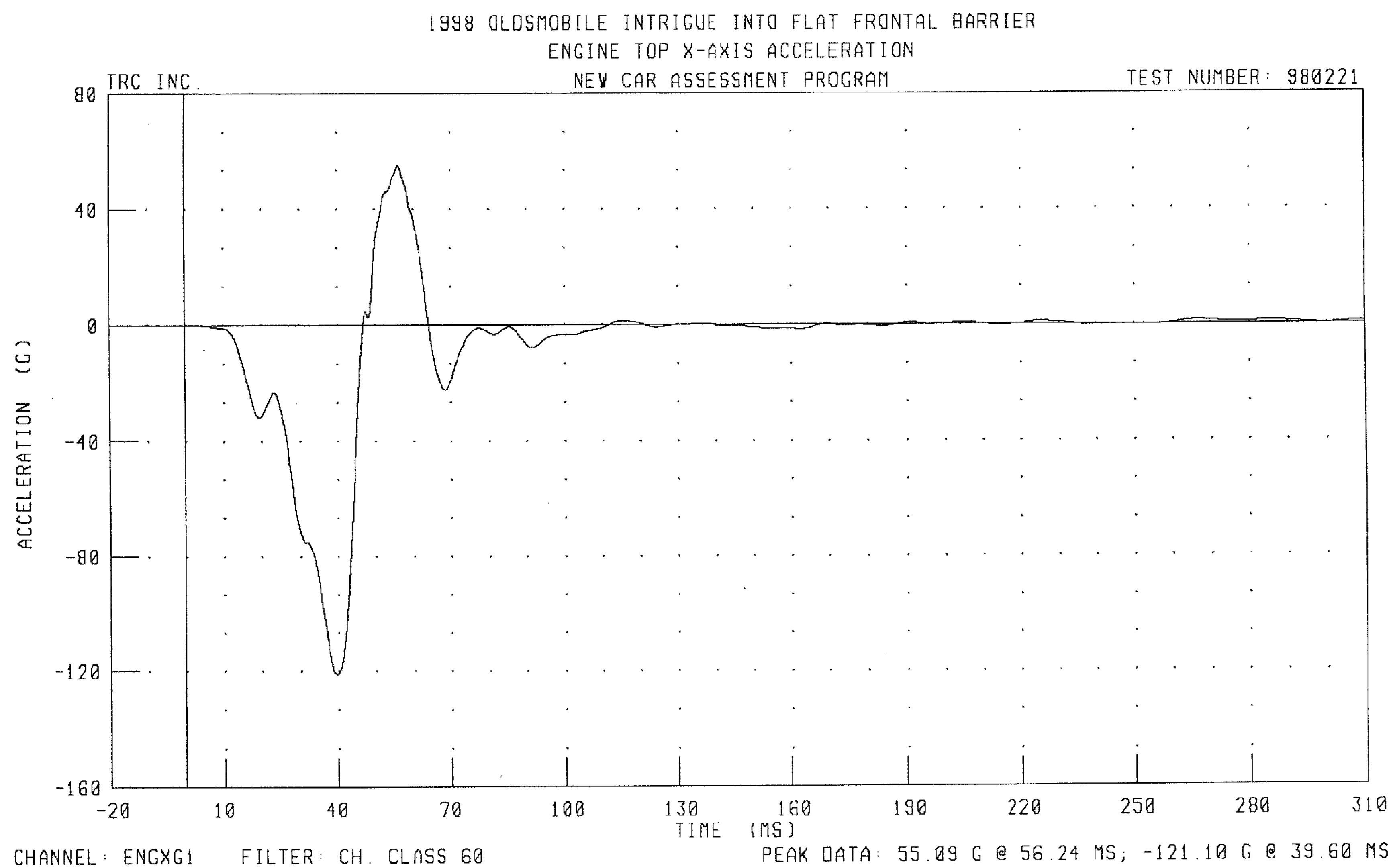
TRC INC.

TEST NUMBER: 980221

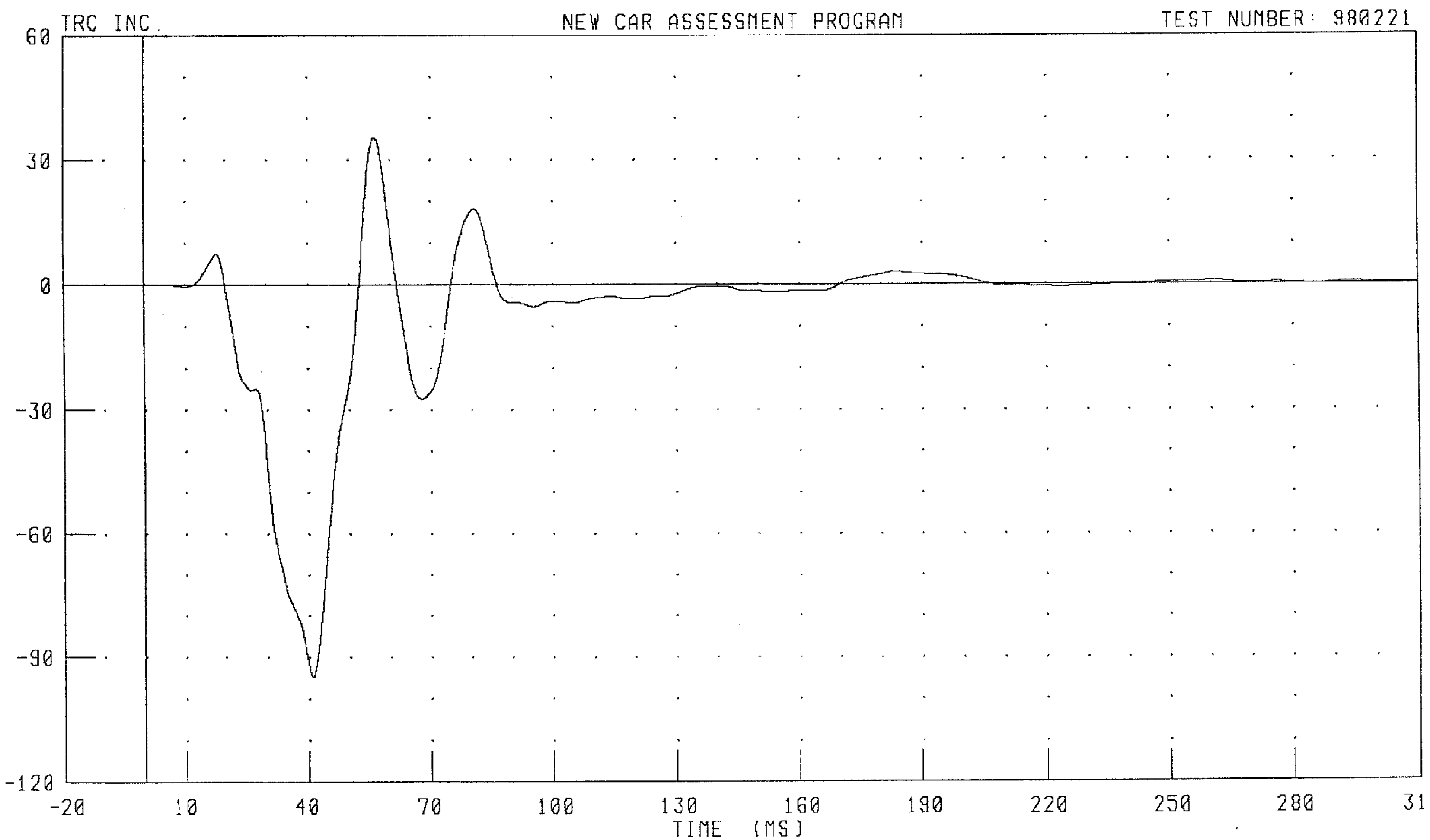


CHANNEL: TRRXD1   FILTER: CH. CLASS 180

PEAK DATA: 1099.85 MM @ 310.00 MS; 0.00 MM @ 0.00 MS

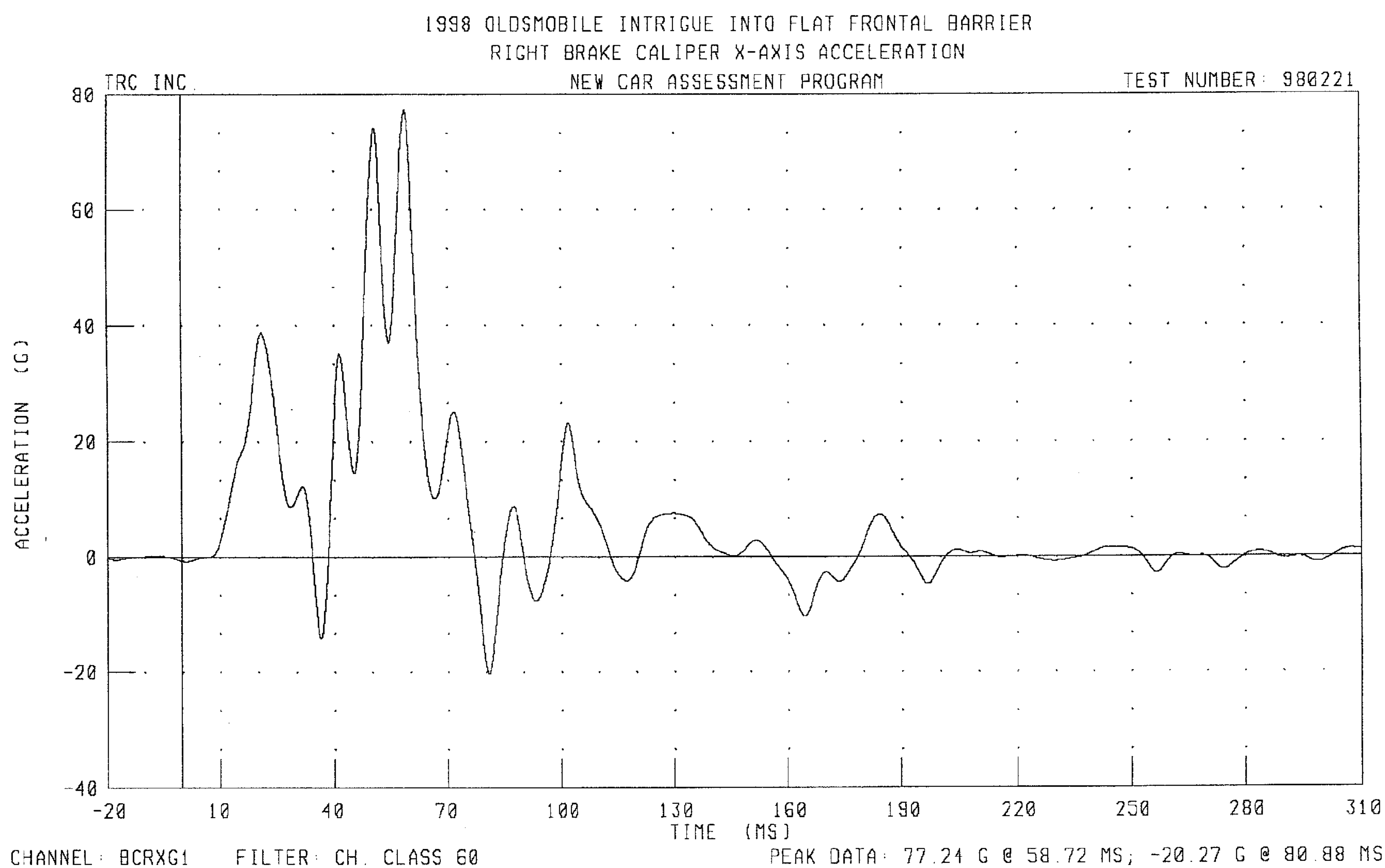

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
ENGINE TOP X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
80
40
0
-40
-80
-120
-160
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ENGXG1
FILTER: CH. CLASS 60
PEAK DATA: 55.09 G @ 56.24 MS; -121.10 G @ 39.60 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

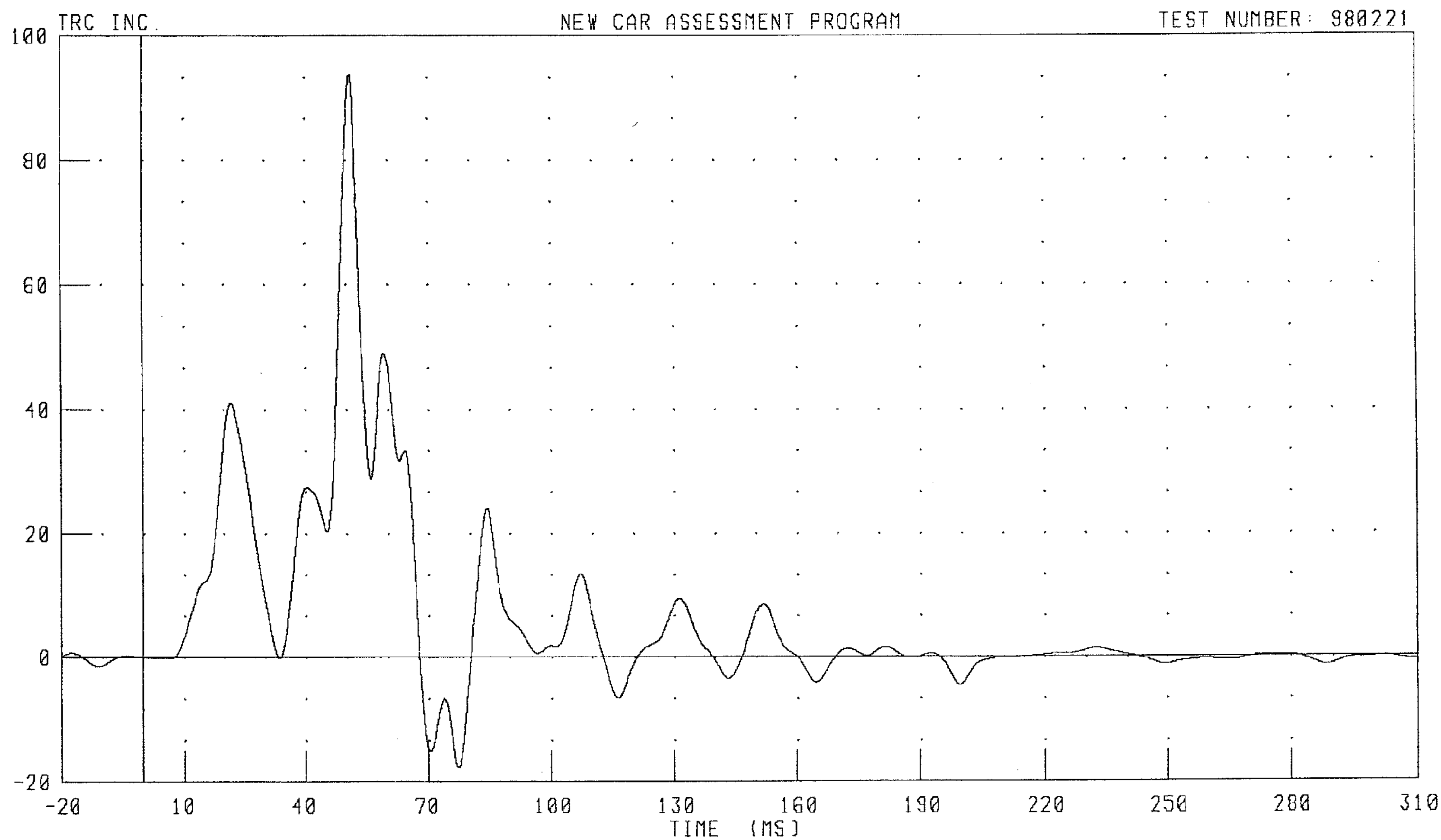


CHANNEL: ENGXG2 FILTER: CH. CLASS 60

PEAK DATA: 35.40 G @ 56.32 MS; -94.74 G @ 41.04 MS

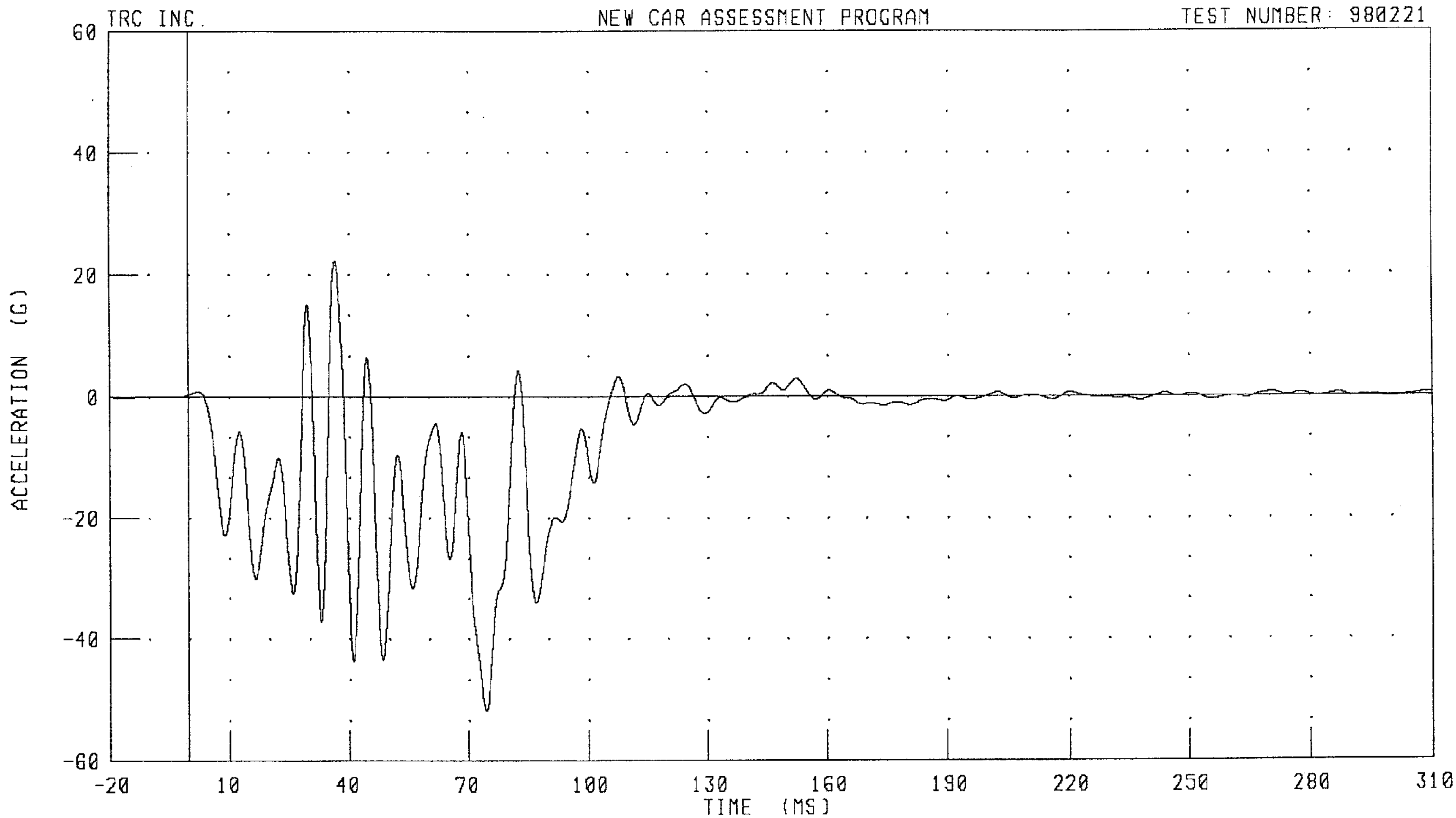

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM
TRC INC.
TEST NUMBER: 980221
ACCELERATION (G)
80
60
40
20
0
-20
-40
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCRXG1
FILTER: CH. CLASS 60
PEAK DATA: 77.24 G @ 58.72 MS; -20.27 G @ 80.88 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: BCLXG1 FILTER: CH. CLASS 60 PEAK DATA: 93.71 G @ 50.96 MS; -17.79 G @ 77.28 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

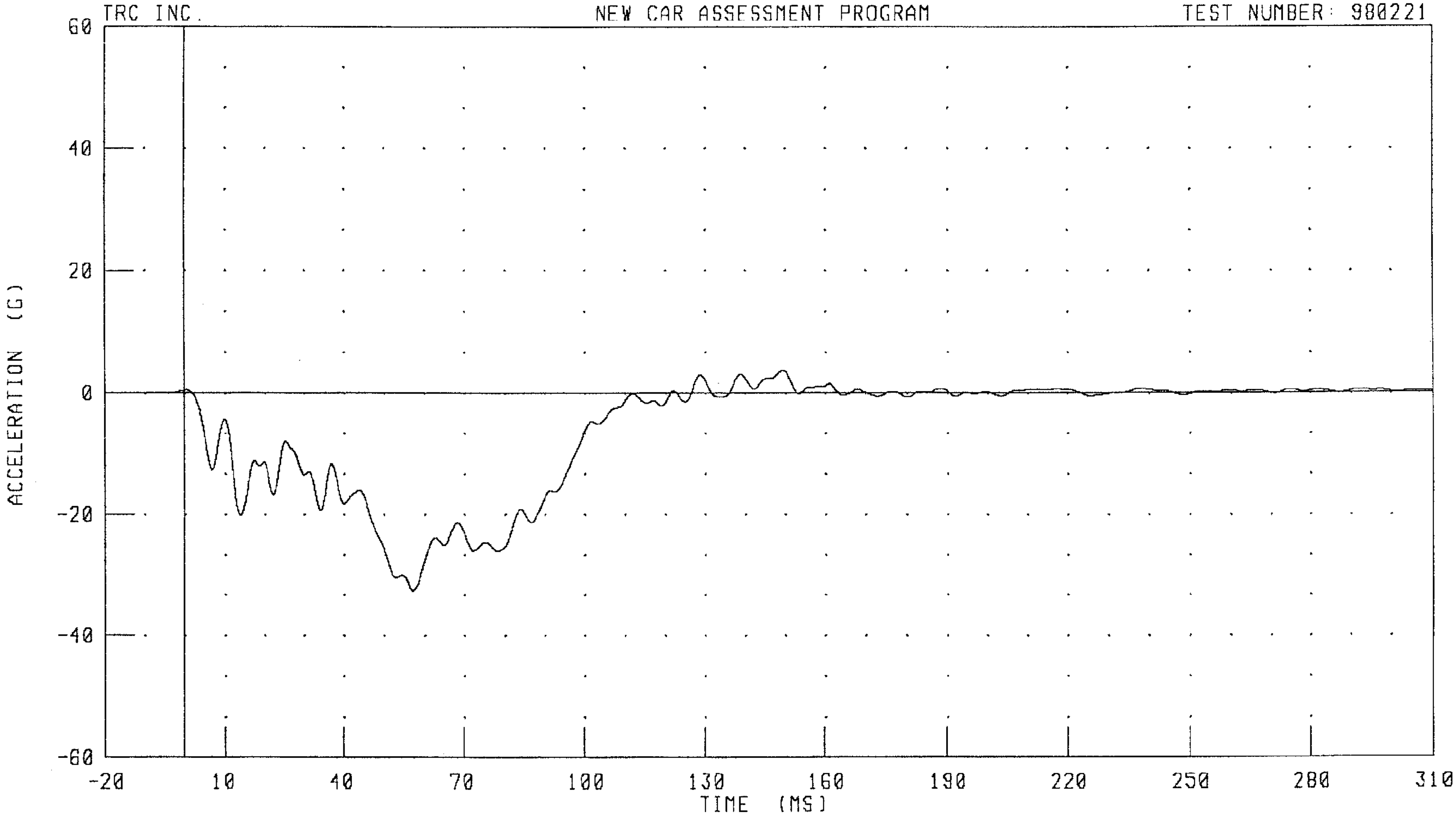


CHANNEL: OPCXG1 FILTER: CH. CLASS 60

PEAK DATA: 22.15 G @ 36.48 MS; -51.83 G @ 74.40 MS

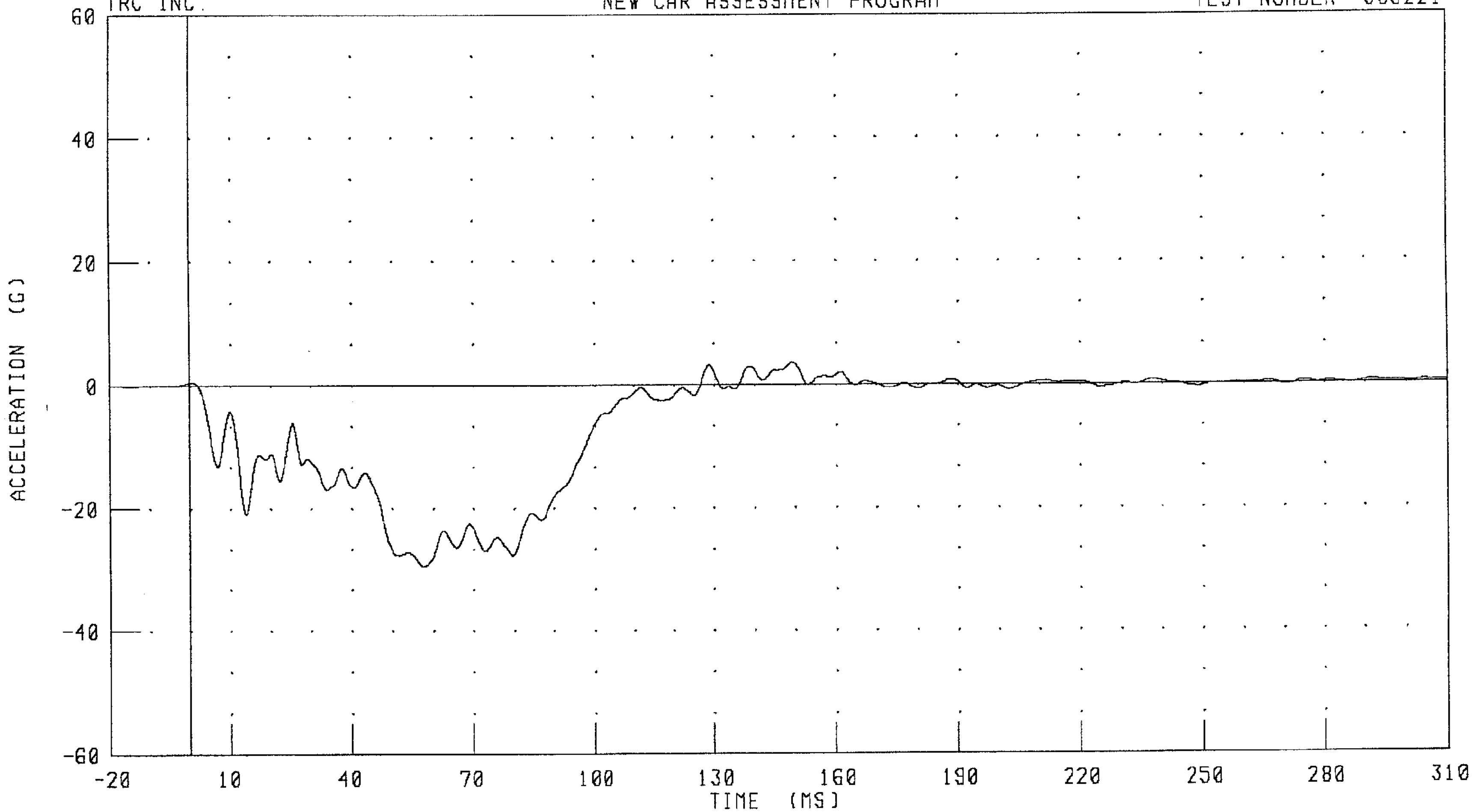
1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT REDUNDANT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TRC INC. TEST NUMBER: 980221



CHANNEL: TLRXGA FILTER: CH. CLASS 60 PEAK DATA: 3.66 G @ 149.52 MS; -32.59 G @ 57.12 MS

1998 OLDSMOBILE INTRIGUE INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT REDUNDANT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM



CHANNEL: TRRXGA FILTER: CH. CLASS 60

PEAK DATA: 3.56 G @ 149.36 MS; -29.48 G @ 57.84 MS

Appendix C

Dummy Certification Data

Pre-test Certification Data

Driver Dummy S/N: 192

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
SN192 ALDERSON 07-02-98

TRC INC. TEST NO: 192C38ED1 572E SN192 EXT.DIMENSION CAL38

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE	(AA)	429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE	(BB)	226 - 231 MM	229. MM
CHEST CIRCUMFERENCE	(Y)	970 -1001 MM	980. MM
WAIST CIRCUMFERENCE	(Z)	836 - 866 MM	861. MM
CHEST DEPTH	(O)	213 - 229 MM	216. MM
H-POINT HEIGHT	(C)	84 - 89 MM	89. MM
H-POINT FROM SEATBACK	(D)	135 - 140 MM	137. MM
SKULL CAP TO BACKLINE	(H)	41 - 46 MM	43. MM
TOTAL SITTING HEIGHT	(A)	879 - 889 MM	884. MM
THIGH CLEARANCE	(F)	140 - 155 MM	145. MM
BUTTOCK KNEE LENGTH	(K)	579 - 605 MM	602. MM
BUTTOCK POPLITEAL LENGTH	(N)	452 - 478 MM	475. MM
POPLITEAL HEIGHT	(L)	429 - 455 MM	447. MM
KNEE PIVOT HEIGHT	(M)	485 - 500 MM	498. MM
FOOT LENGTH	(P)	252 - 267 MM	262. MM
FOOT BREADTH	(W)	91 - 107 MM	99. MM
SHOULDER PIVOT FROM BACKLINE	(E)	84 - 94 MM	94. MM
SHOULDER BREADTH	(V)	422 - 437 MM	427. MM
SHOULDER PIVOT HEIGHT	(B)	506 - 521 MM	511. MM
ELBOW REST HEIGHT	(J)	191 - 211 MM	203. MM
SHOULDER-ELBOW LENGTH	(I)	330 - 345 MM	333. MM
BACK OF ELBOW TO WRIST PIVOT	(G)	290 - 305 MM	295. MM

DUMMY MEETS SPECIFICATIONS
TECHNICIAN ______________ RUN NUMBER: 030298.0921

980221

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

TRC INC. TEST NO: 192C38HD1 572E SN192 HEAD DROP CAL 38

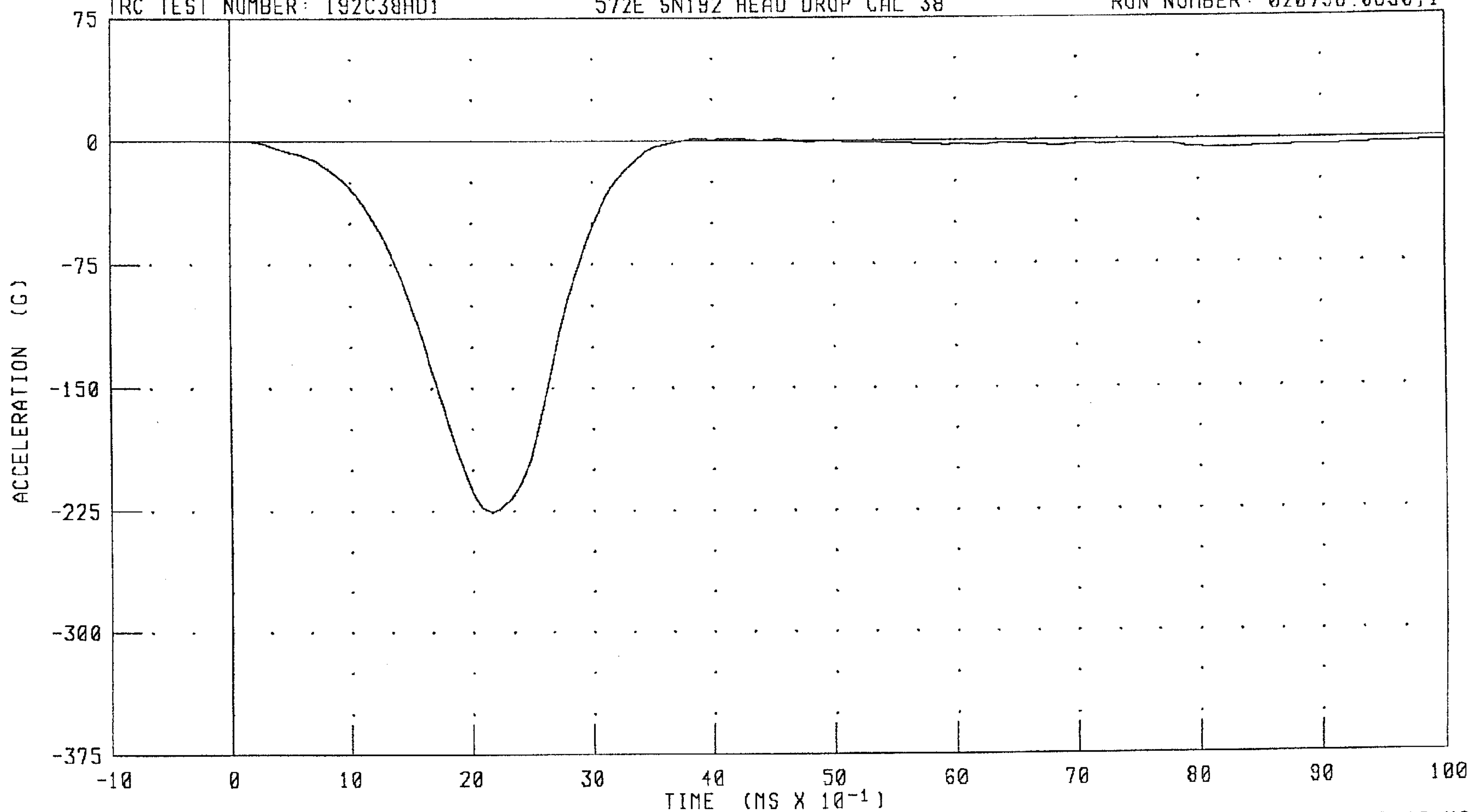
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	256.16 G
PEAK LATERAL ACCELERATION	15 G MAX	-9.23 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claudge RUN NUMBER: 020798.0849;1

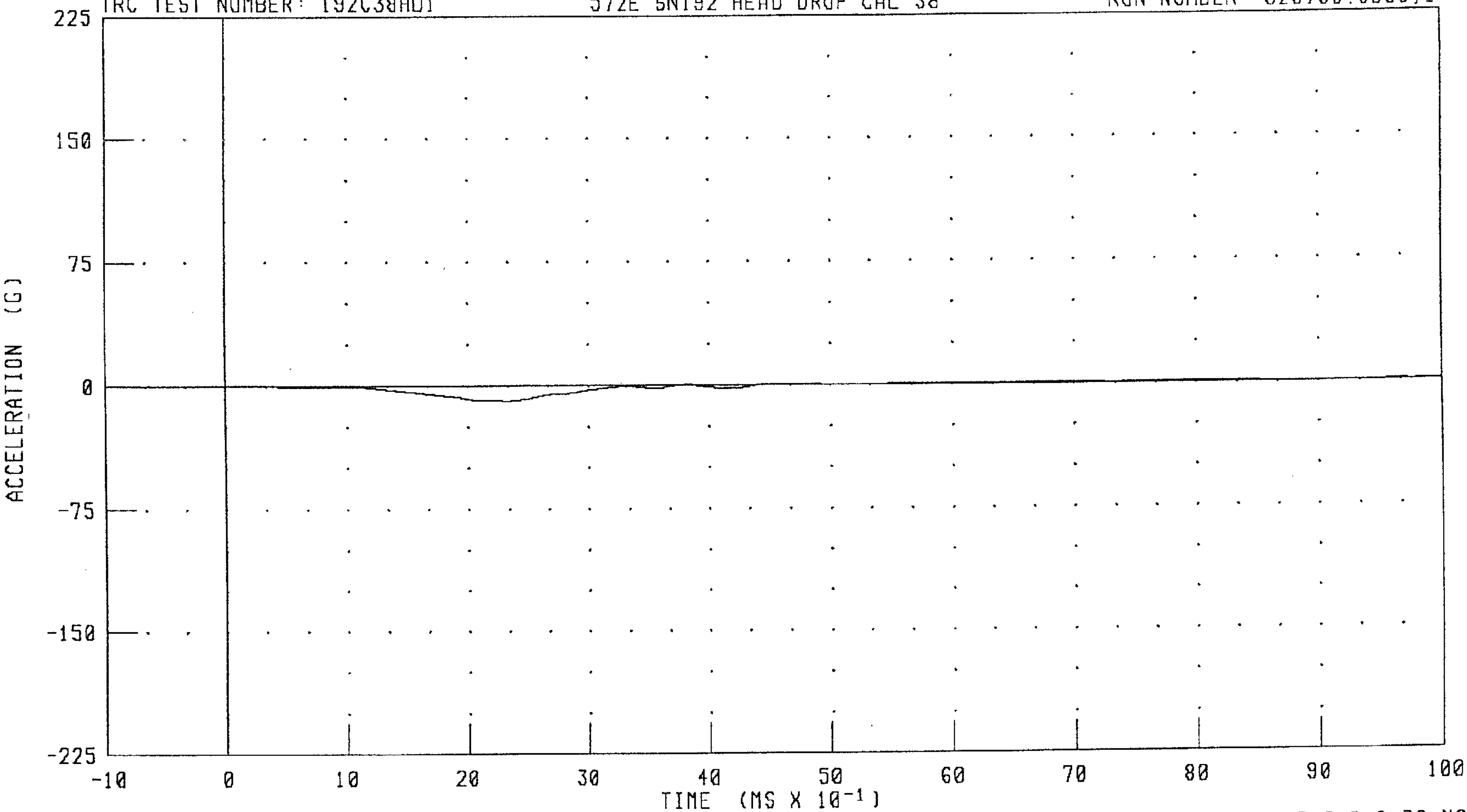
PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 192C38HD1 572E SN192 HEAD DROP CAL 38 RUN NUMBER: 020798.0850;1



CHANNEL: HEDXG FILTER: CH. CLASS 1000 PEAK DATA: 1.30 G @ 4.16 MS; -226.00 G @ 2.16 MS

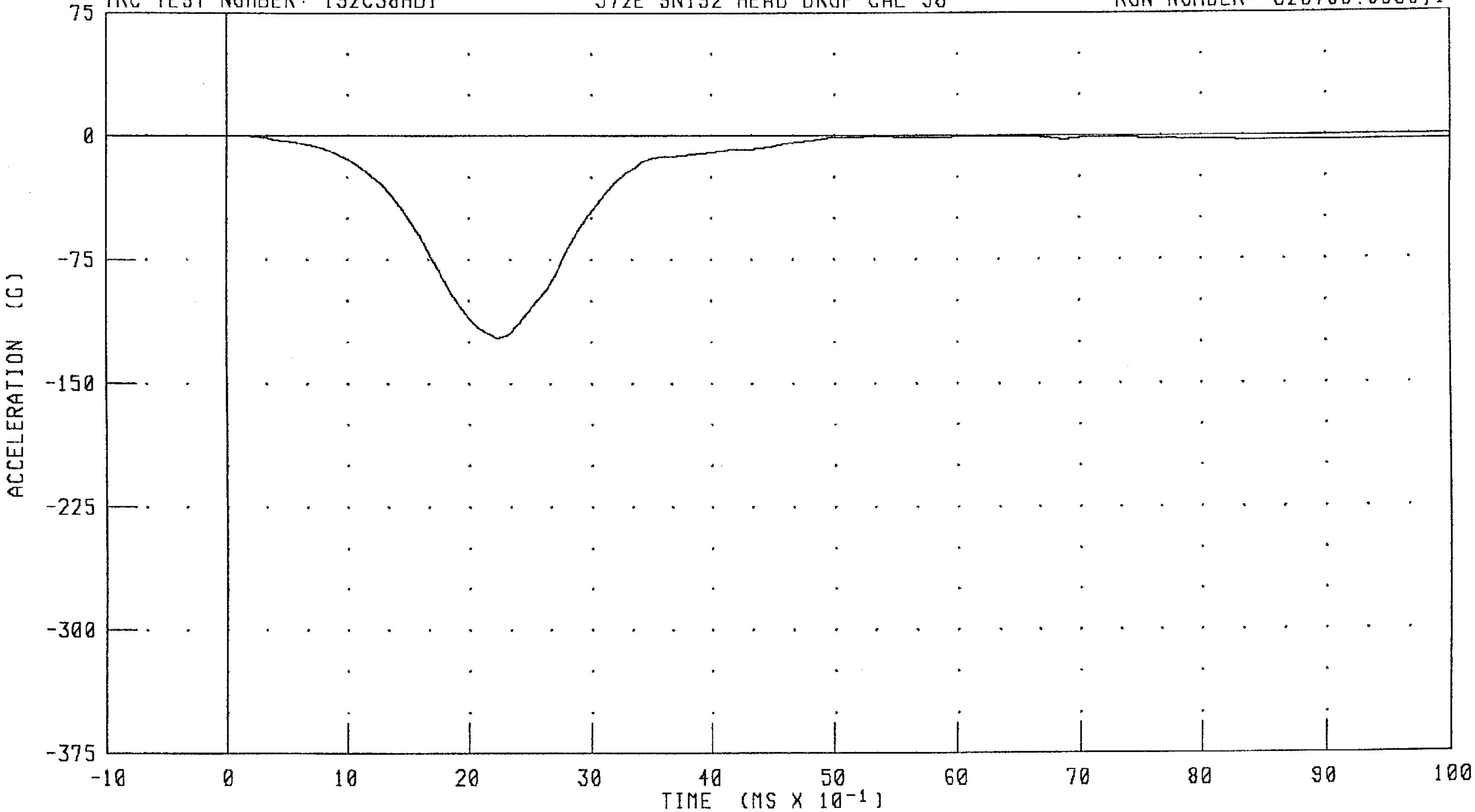
PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 192C38HD1 572E SN192 HEAD DROP CAL 38 RUN NUMBER: 020798.0850;1



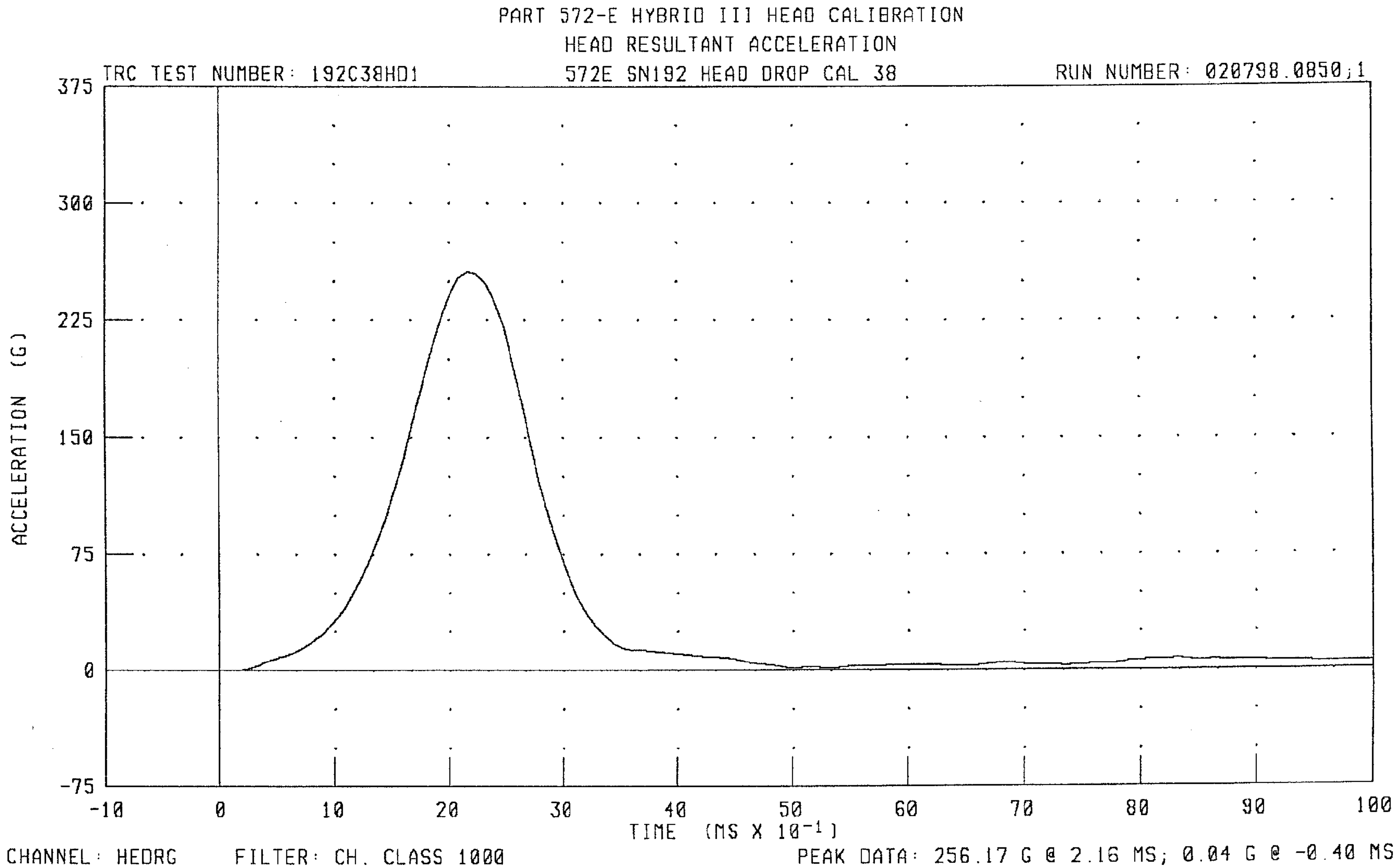
CHANNEL: HEDYG FILTER: CH. CLASS 1000 PEAK DATA: 0.84 G @ 7.84 MS; -9.23 G @ 2.32 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 192C38HD1 572E SN192 HEAD DROP CAL 38 RUN NUMBER: 020798.0850;1



CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: -0.03 G @ -0.40 MS; -122.50 G @ 2.24 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 192C38HD1
572E SN192 HEAD DROP CAL 38
RUN NUMBER: 020798.0850;1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL: HEDRG
FILTER: CH. CLASS 1000
PEAK DATA: 256.17 G @ 2.16 MS; 0.04 G @ -0.40 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

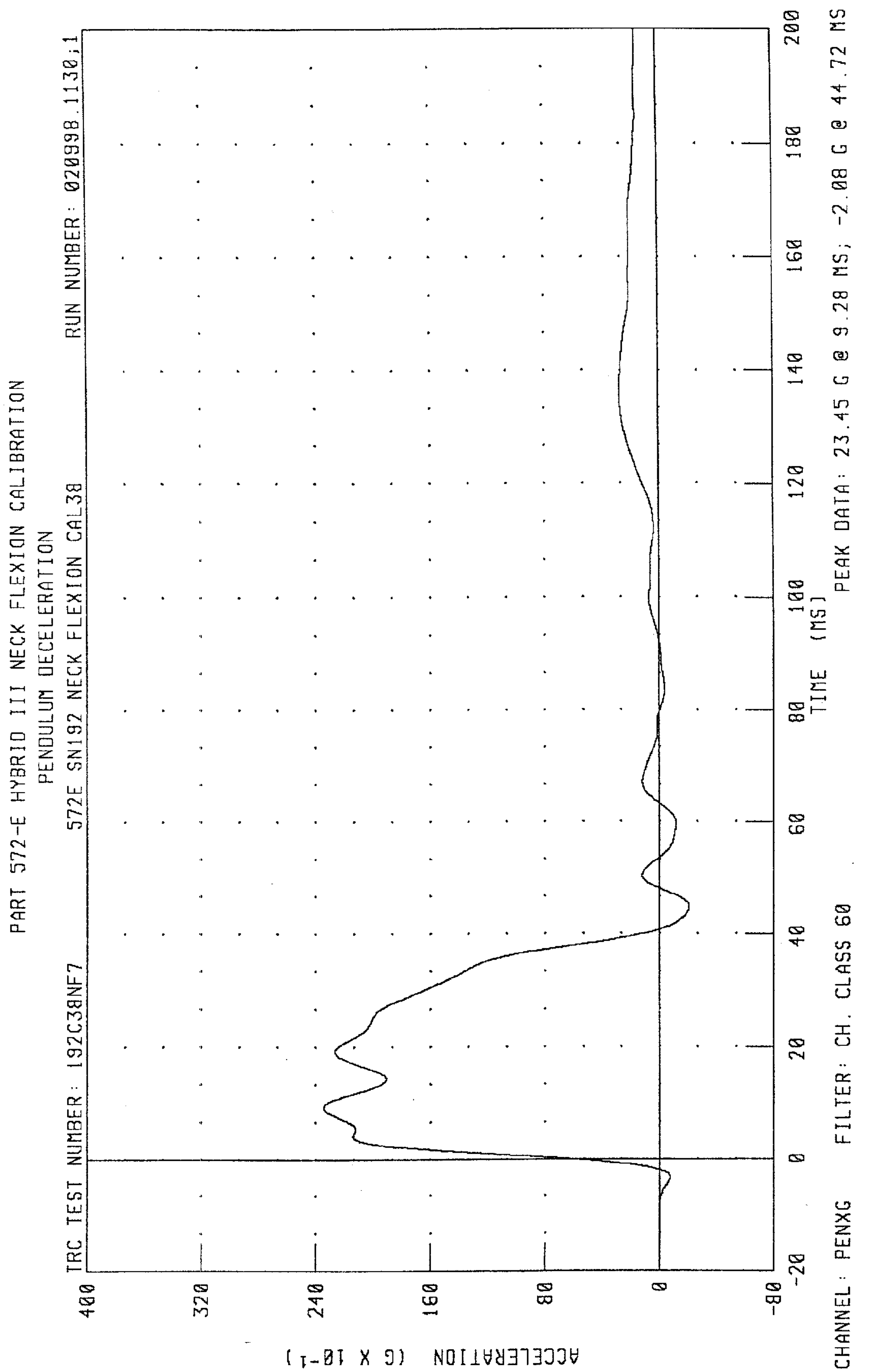
TRC INC. TEST NO: 192C38NF7 572E SN192 NECK FLEXION CAL38

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	37.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	23.24 G
	20 MS	17.60 - 22.60 G	22.46 G
	30 MS	12.50 - 18.50 G	16.45 G
MAX PENDULUM G		29 G MAX	23.44 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.37 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	38.32 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	71.89 DEG.
	TIME	57 - 64 MS	58.24 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	100.32 NM
	TIME	47 - 58 MS	51.20 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	114.48 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	100.96 MS

TEST MEETS SPECIFICATIONS

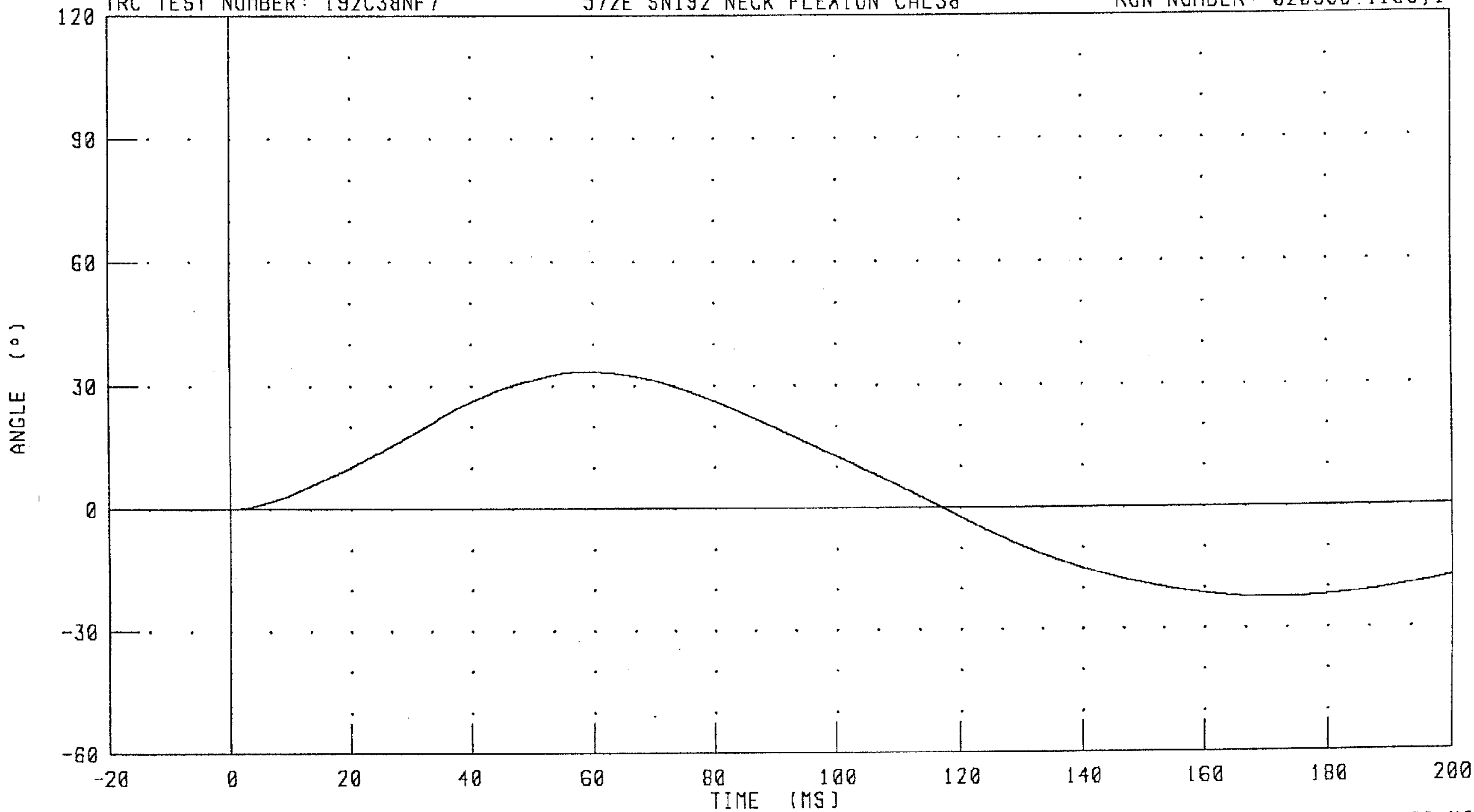
TECHNICIAN By Colt

RUN NUMBER: 020998.1129;1


PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION
572E SN192 NECK FLEXION CAL38
TRC TEST NUMBER: 192C38NF7
RUN NUMBER: 020998.1130;1
ACCELERATION (G X 10-1)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 60
PEAK DATA: 23.45 G @ 9.28 MS; -2.08 G @ 44.72 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

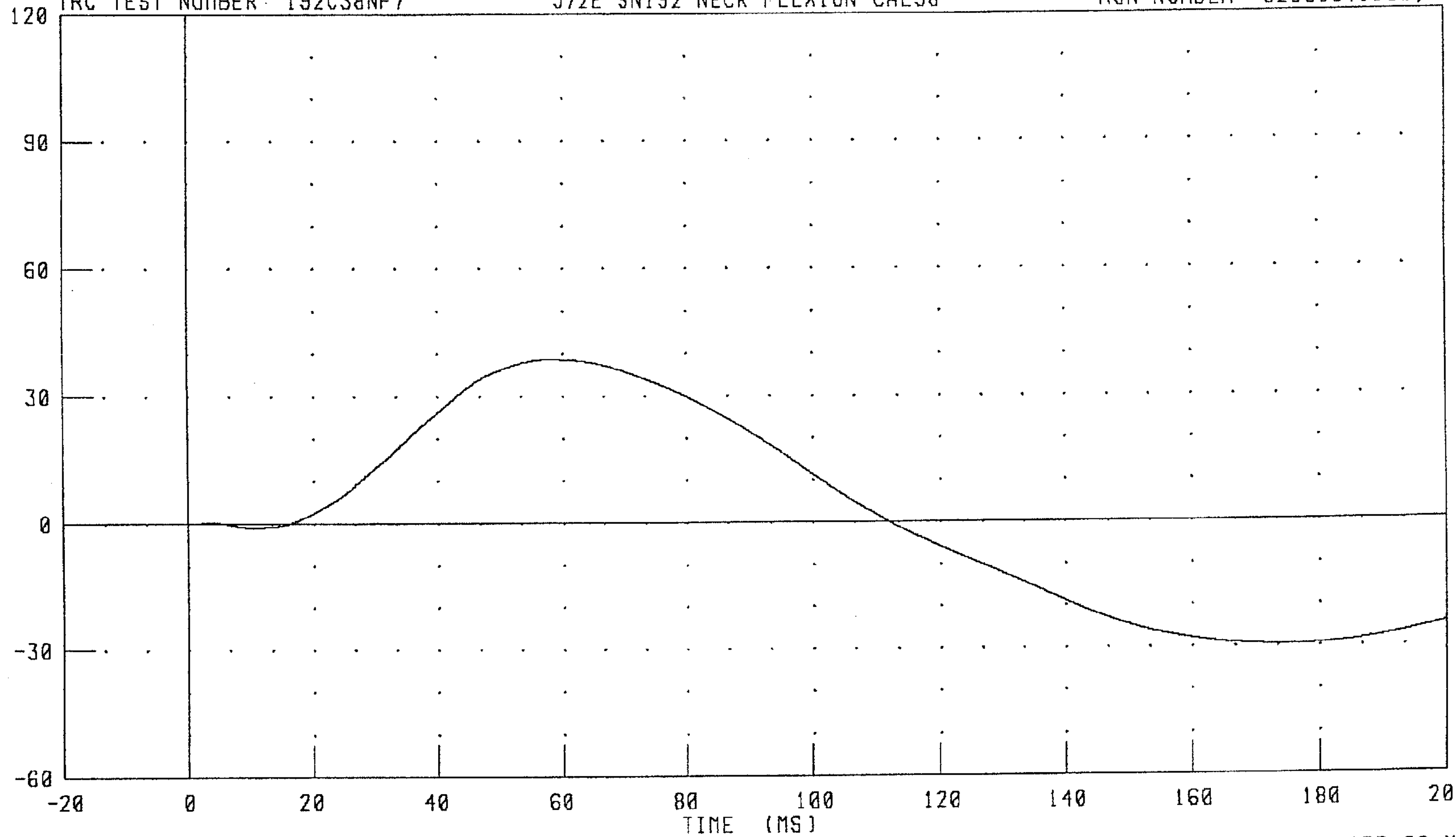
TRC TEST NUMBER: 192C38NF7 572E SN192 NECK FLEXION CAL38 RUN NUMBER: 020998.1130;1



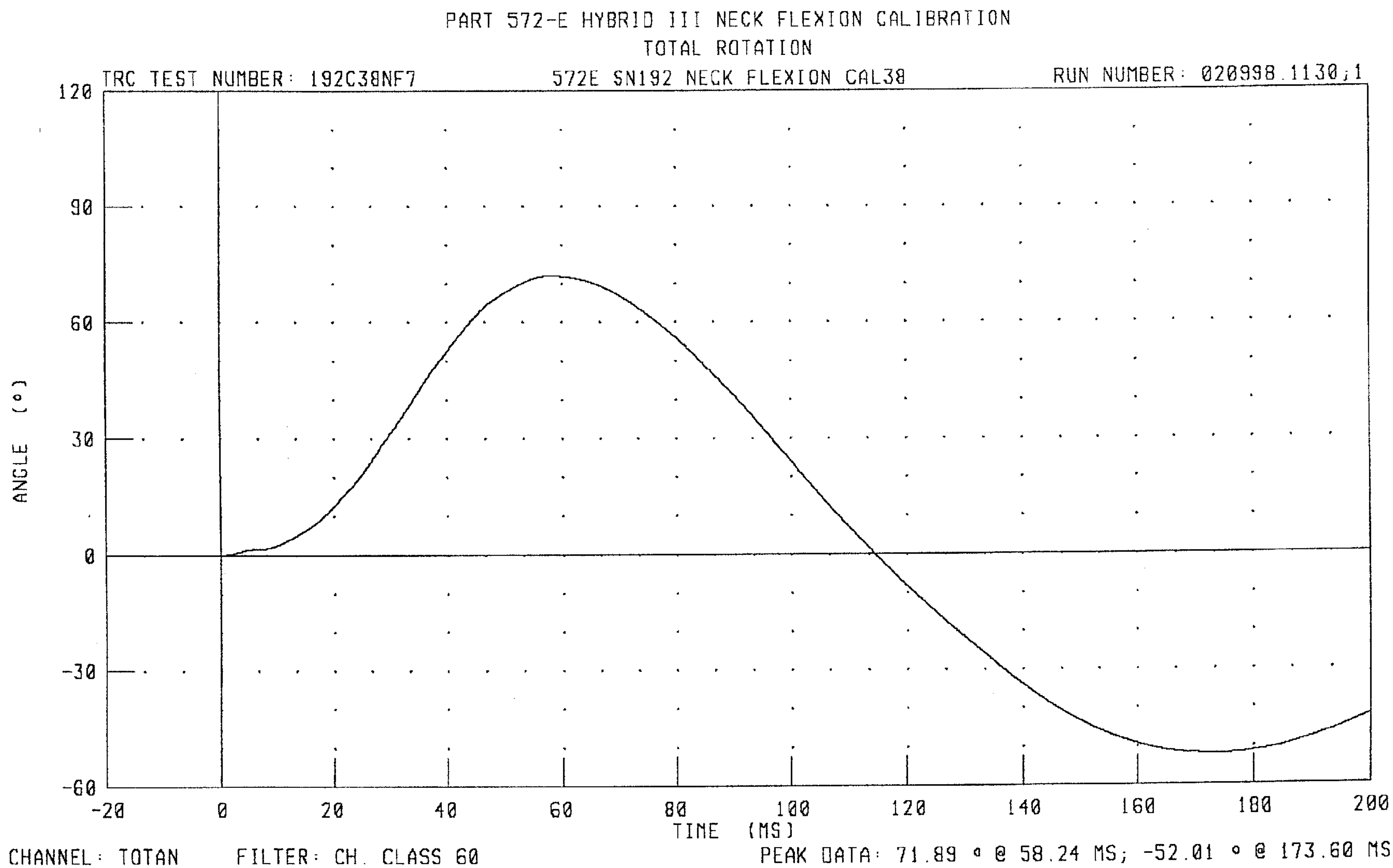
CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 33.32 ° @ 58.64 MS; -22.39 ° @ 170.88 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

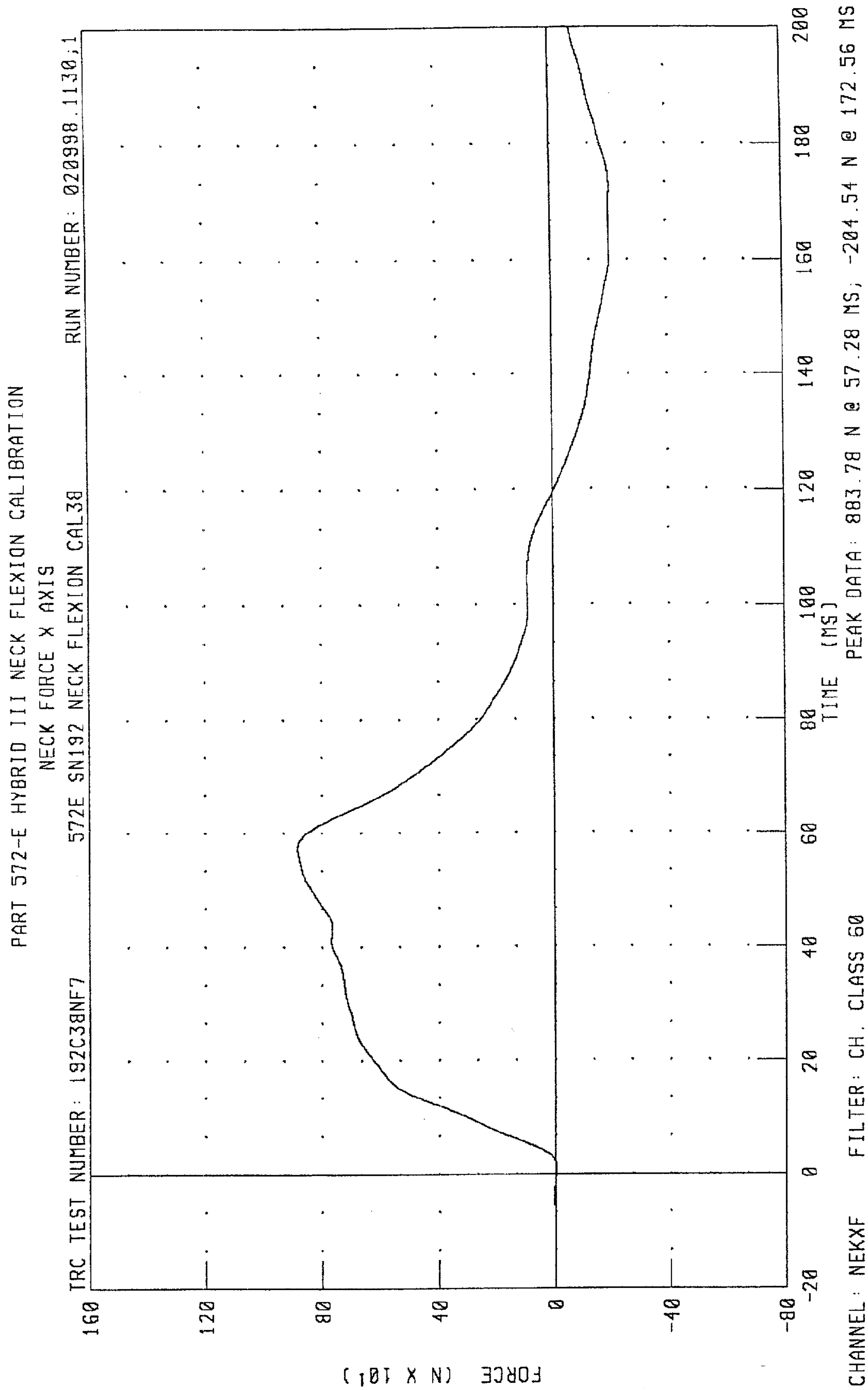
TRC TEST NUMBER: 192C38NF7 572E SN192 NECK FLEXION CAL38 RUN NUMBER: 020998.1130;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 38.58 ° @ 57.84 MS; -29.68 ° @ 175.20 MS

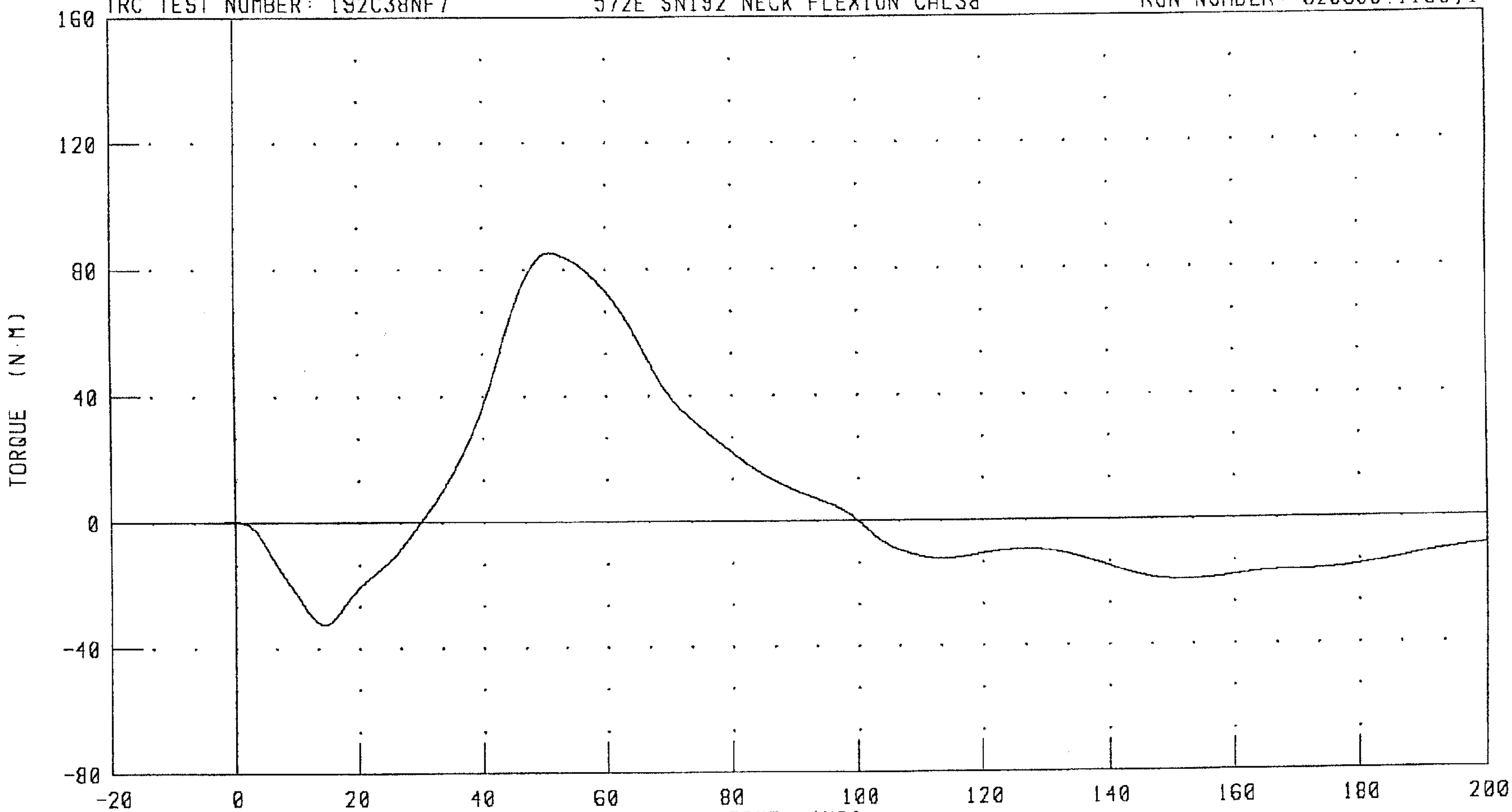


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 192C38NF7
572E SN192 NECK FLEXION CAL38
RUN NUMBER: 020998.1130;1
ANGLE (°)
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 71.89 ° @ 58.24 MS; -52.01 ° @ 173.60 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS
572E SN192 NECK FLEXION CAL38
TRC TEST NUMBER: 192C38NF7
RUN NUMBER: 020998.1130;1
FORCE (N X 10¹)
160
120
80
40
0
-40
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXF
FILTER: CH. CLASS 60
PEAK DATA: 883.78 N @ 57.28 MS; -204.54 N @ 172.56 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

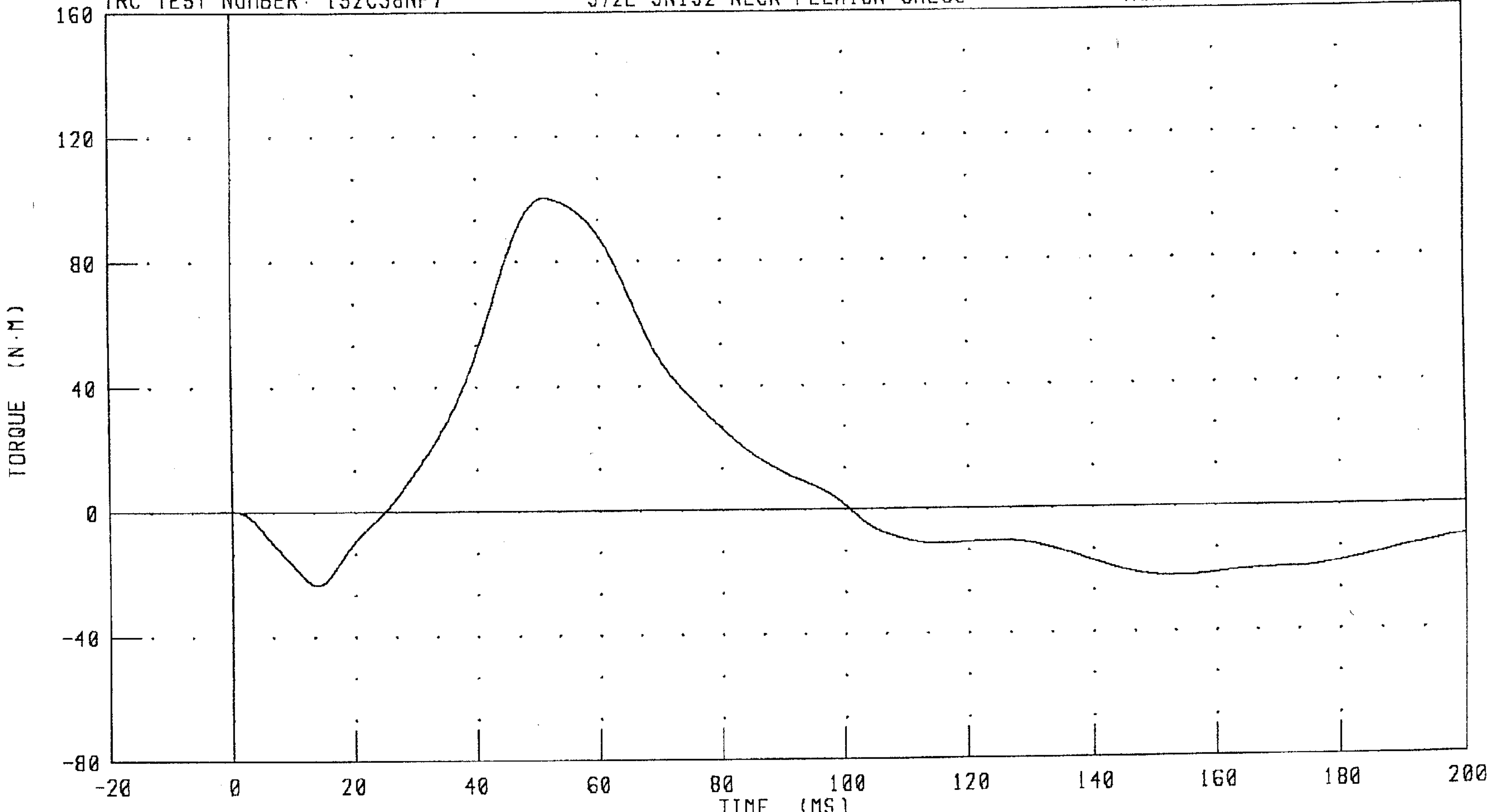
TRC TEST NUMBER: 192C38NF7 572E SN192 NECK FLEXION CAL38 RUN NUMBER: 020998.1130;1



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 85.25 N·M @ 50.96 MS; -32.49 N·M @ 14.48 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 192C38NF7 572E SN192 NECK FLEXION CAL38 RUN NUMBER: 020998.1130;1



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 100.32 N·M @ 51.20 MS; -23.41 N·M @ 14.00 MS

980221

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 192C38NE1 572E SN192 NECK EXT. CAL38

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	37.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.00 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.70 G
	20 MS	14.00 - 19.00 G	17.01 G
	30 MS	11.00 - 16.00 G	14.65 G
MAX PENDULUM G		22 G MAX	18.08 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.60 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	40.64 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	95.34 DEG.
	TIME	72 - 82 MS	77.52 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-67.33 NM
	TIME	65 - 79 MS	71.84 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	155.92 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	142.64 MS

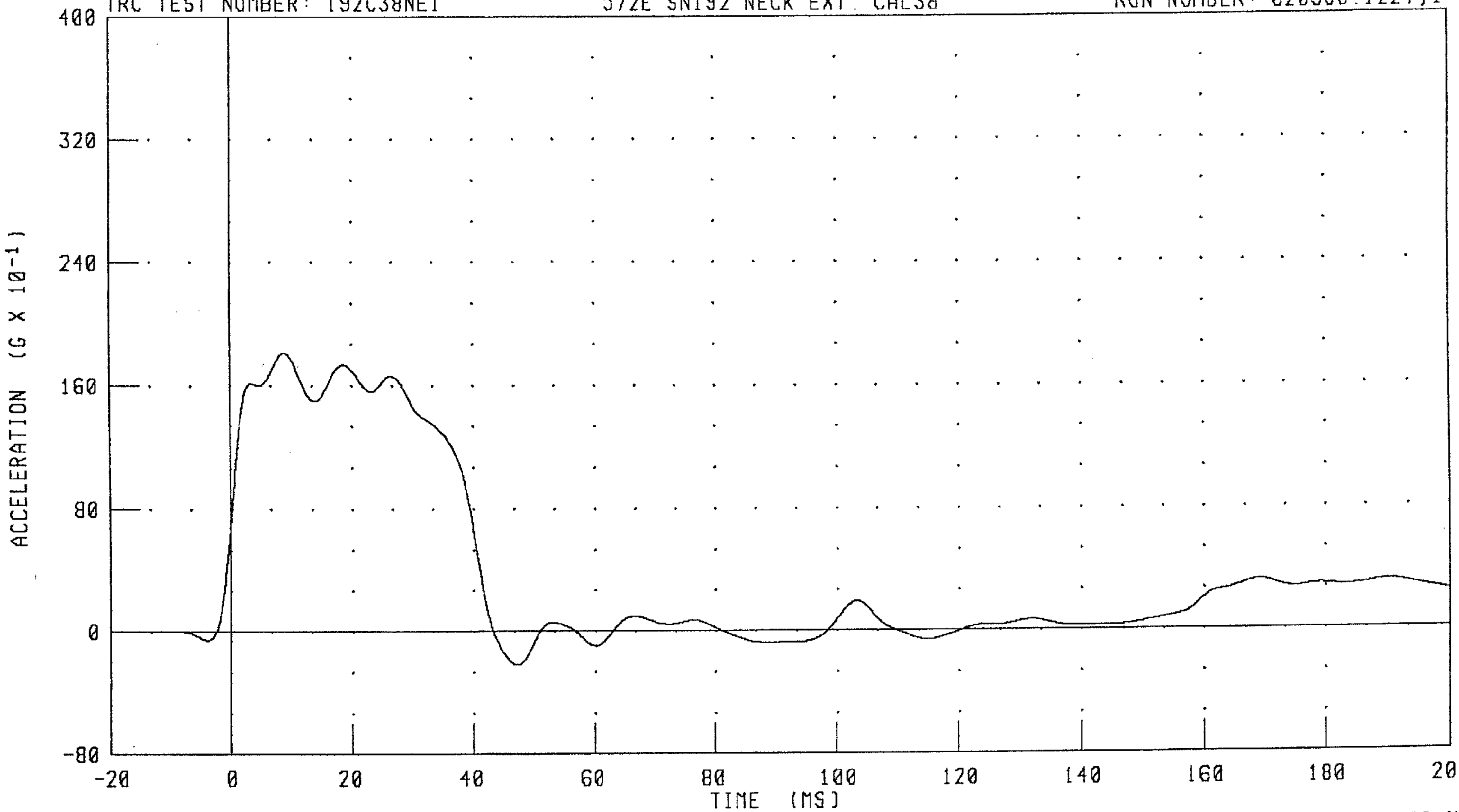
TEST MEETS SPECIFICATIONS

TECHNICIAN B Colt

RUN NUMBER: 020998.1226;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 192C38NE1 572E SN192 NECK EXT. CAL38 RUN NUMBER: 020998.1227;1



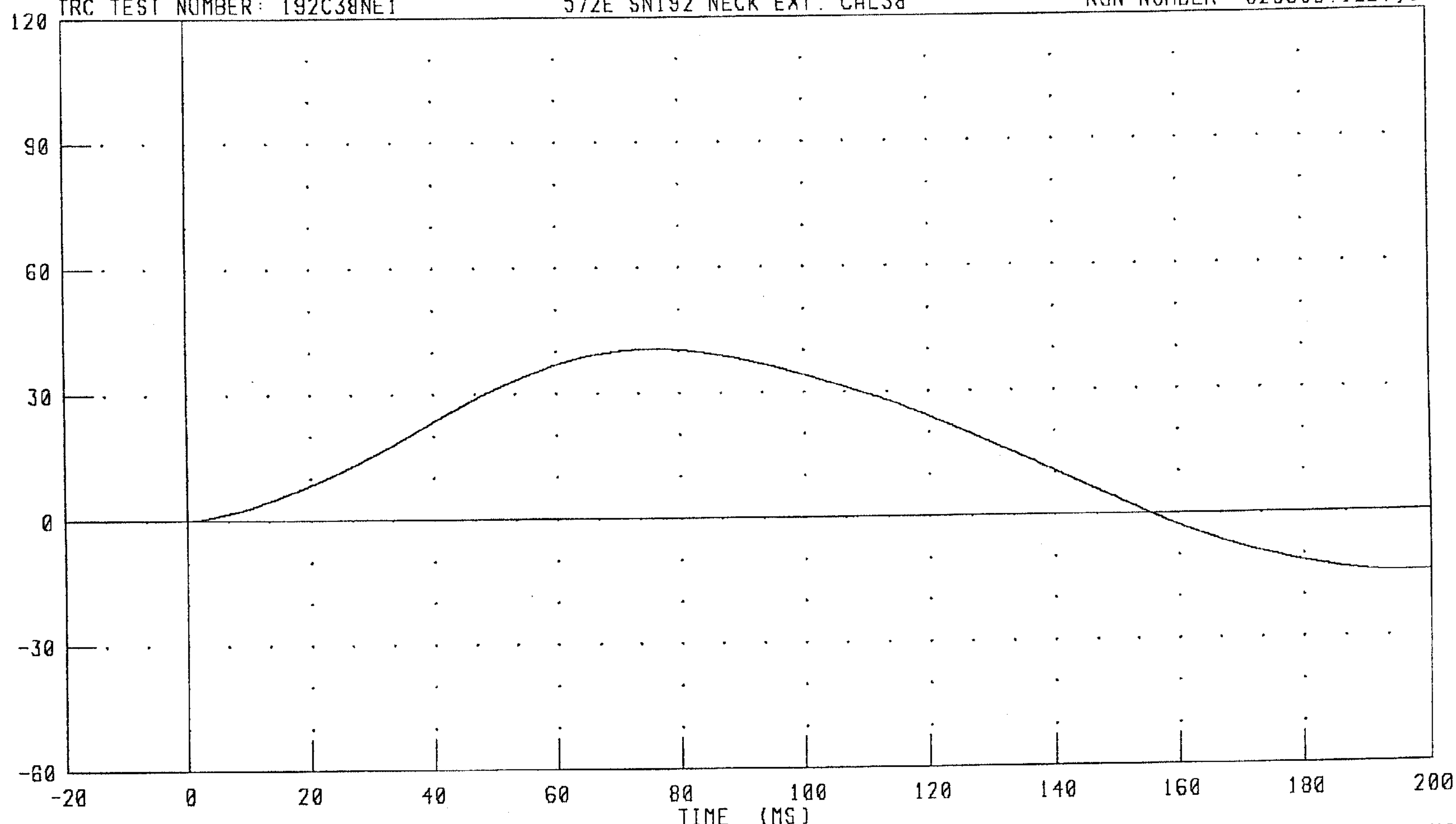
CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 18.09 G @ 8.88 MS; -2.18 G @ 47.20 MS

980221

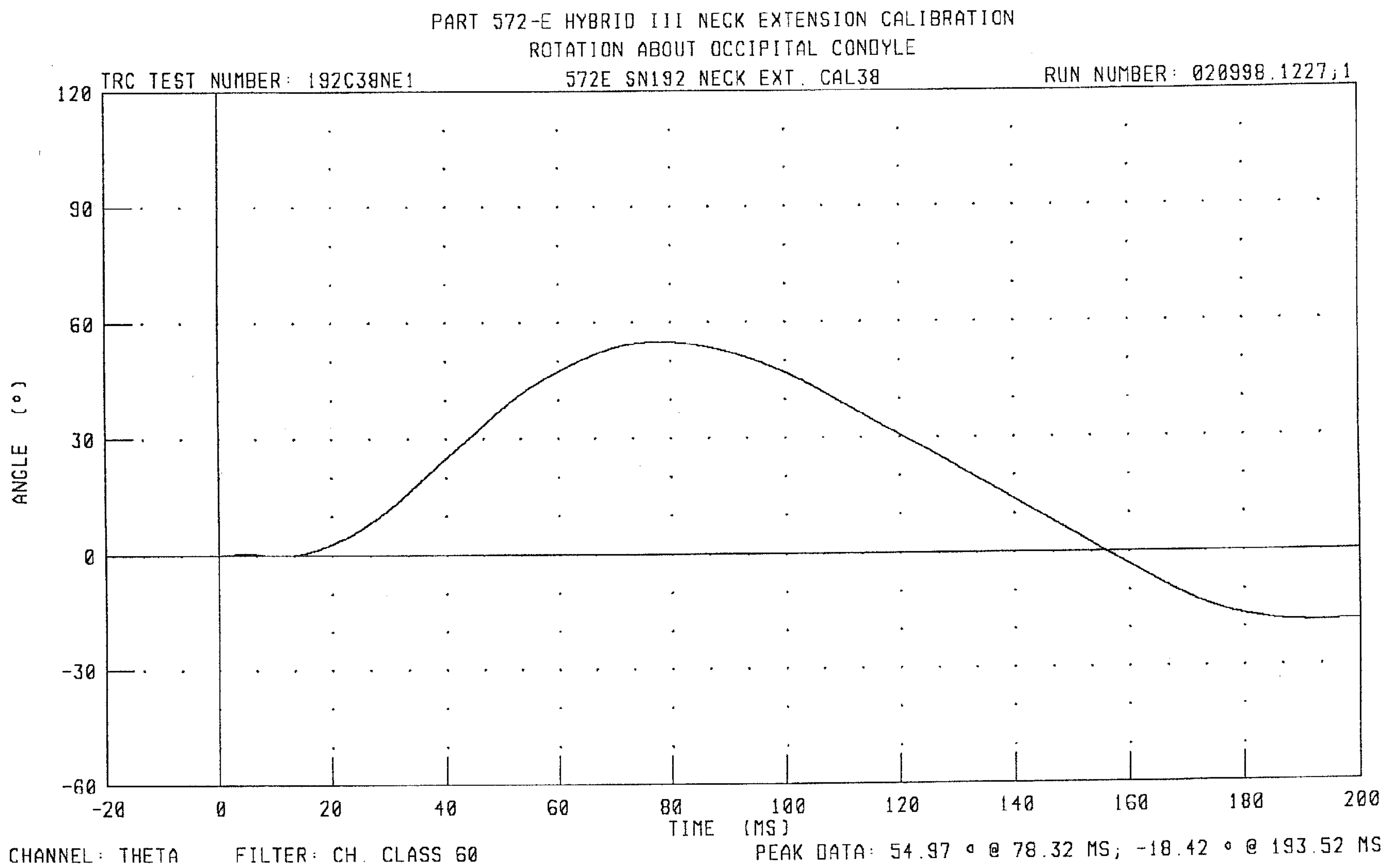
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 192C38NE1 | 572E SN192 NECK EXT. CAL38 | RUN NUMBER: 020998.1227;1



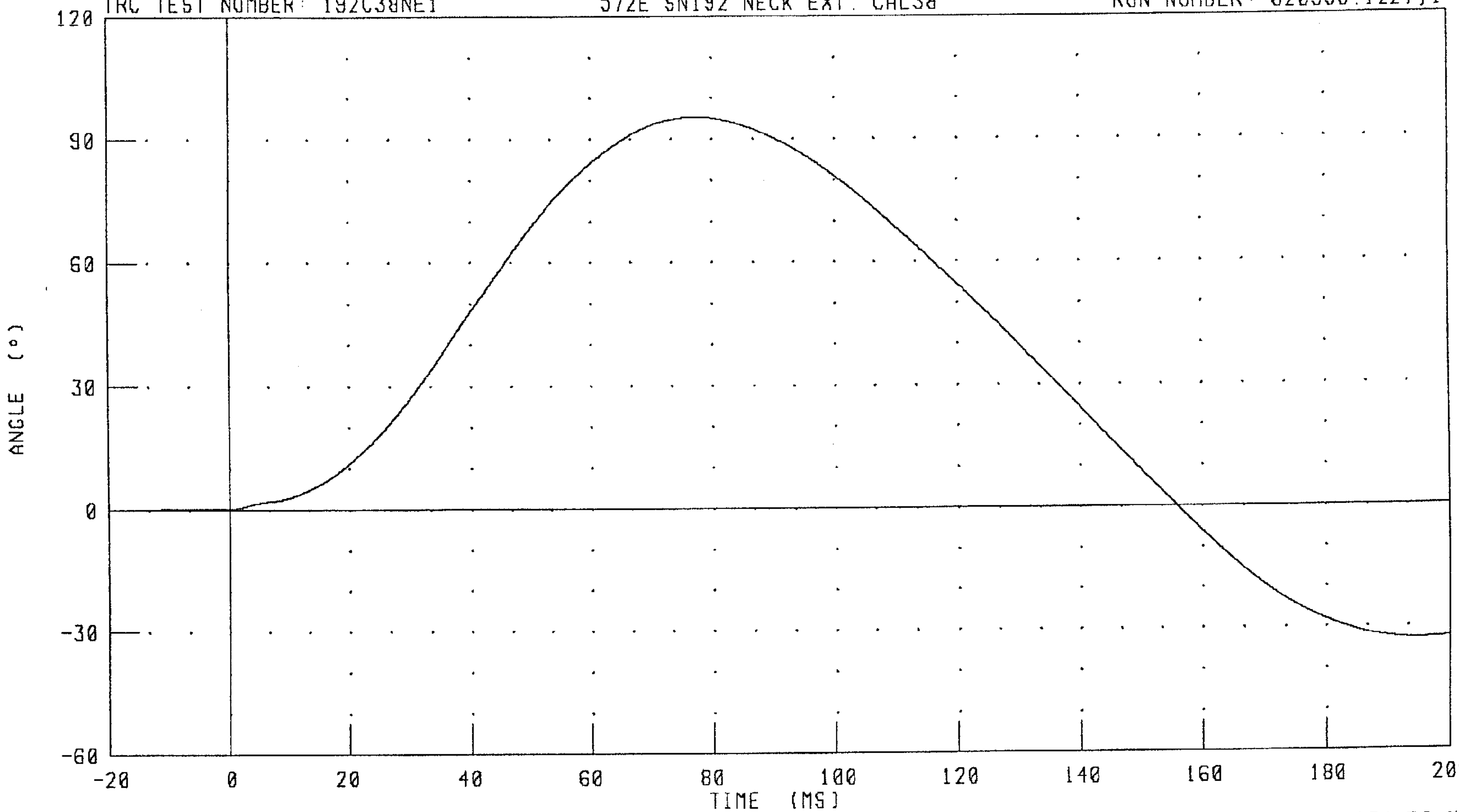
CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 40.43 ° @ 75.84 MS; -14.50 ° @ 195.52 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 192C38NE1
572E SN192 NECK EXT. CAL38
RUN NUMBER: 020998.1227;1
ANGLE (°)
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 54.97 ° @ 78.32 MS; -18.42 ° @ 193.52 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

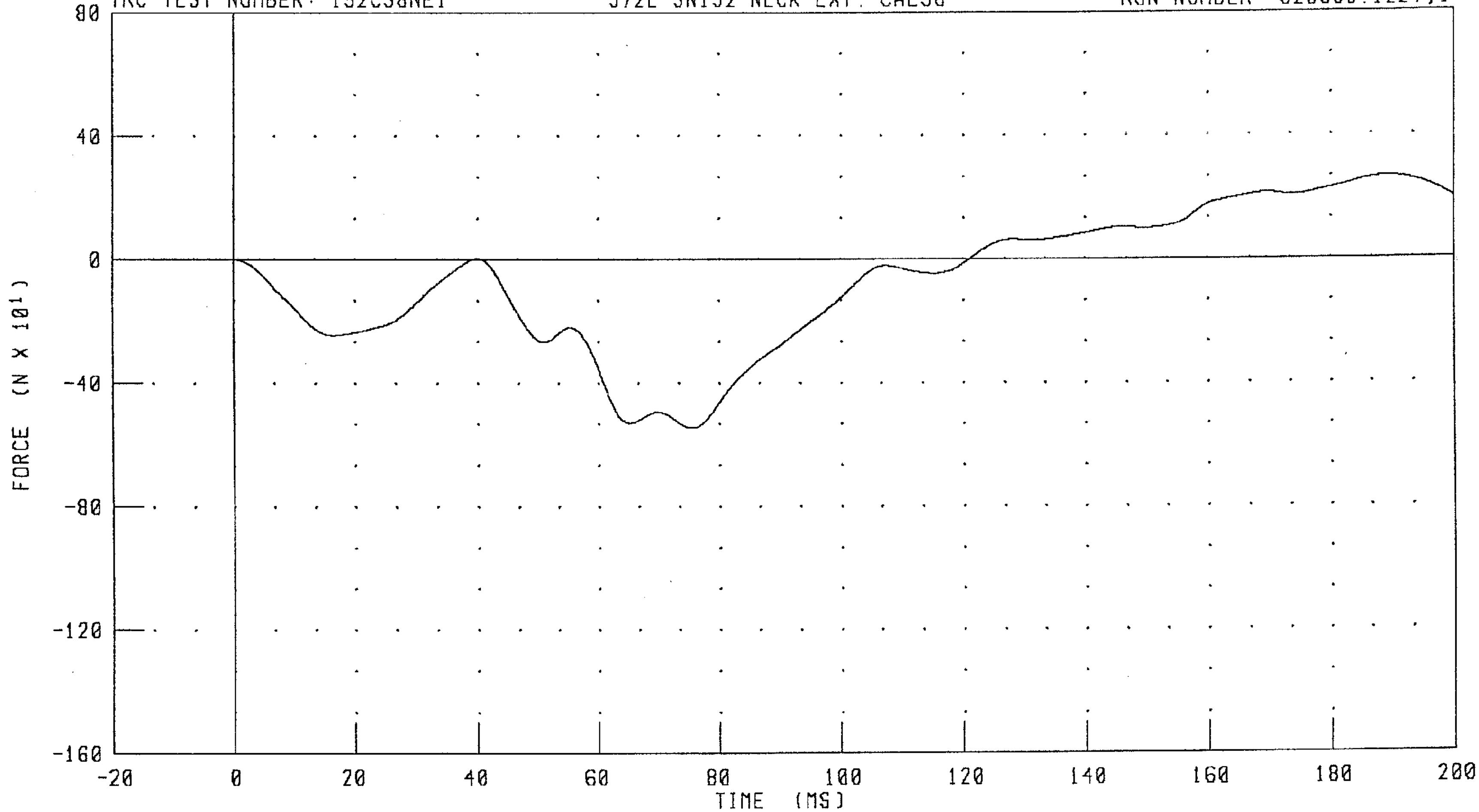
TRC TEST NUMBER: 192C38NE1 572E SN192 NECK EXT. CAL38 RUN NUMBER: 020998.1227;1



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 95.35 ° @ 77.52 MS; -32.90 ° @ 194.72 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS

TRC TEST NUMBER: 192C38NE1 572E SN192 NECK EXT. CAL38 RUN NUMBER: 020998.1227;1

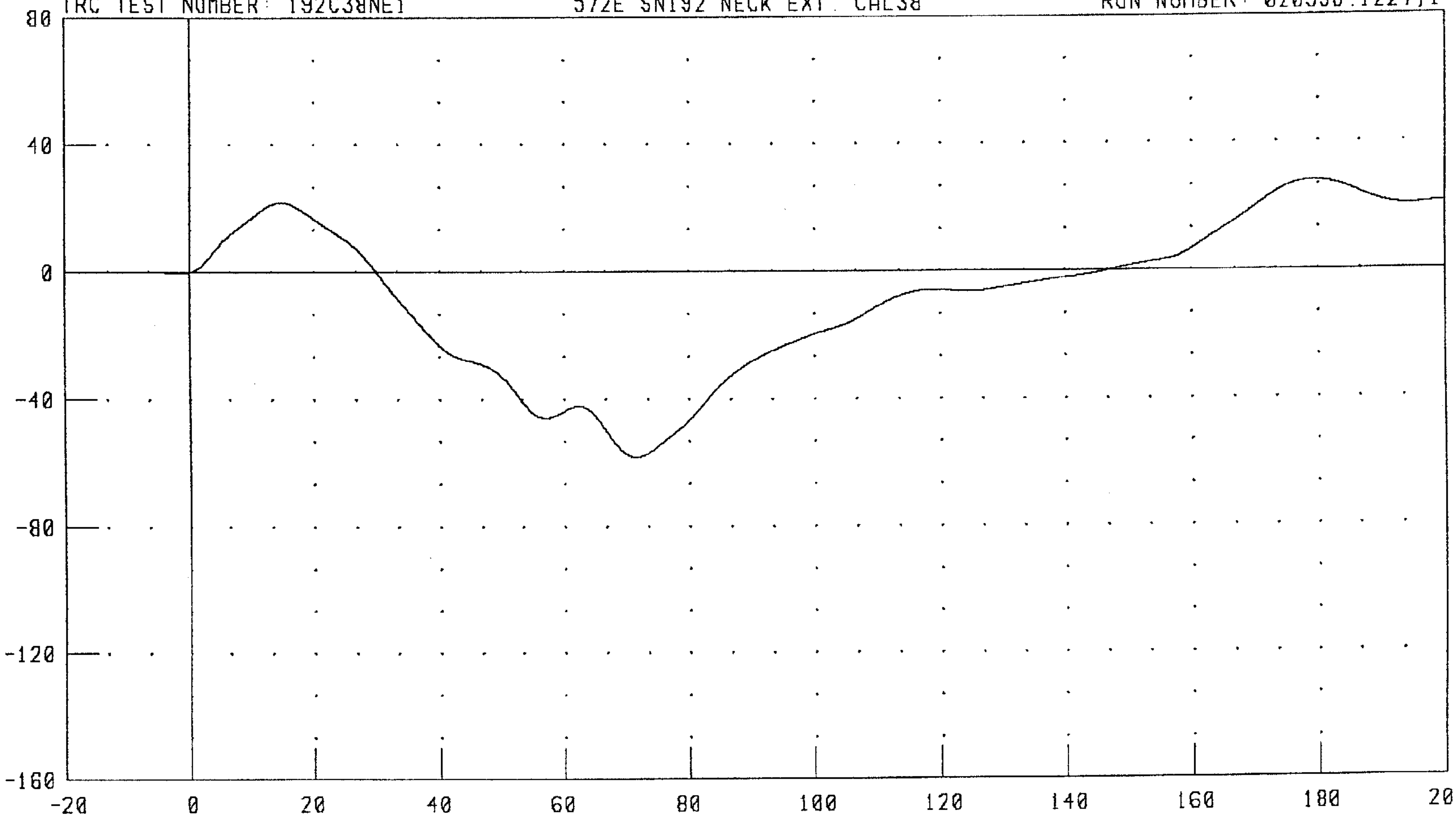


CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 263.82 N @ 189.44 MS; -546.96 N @ 75.52 MS

980221

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS

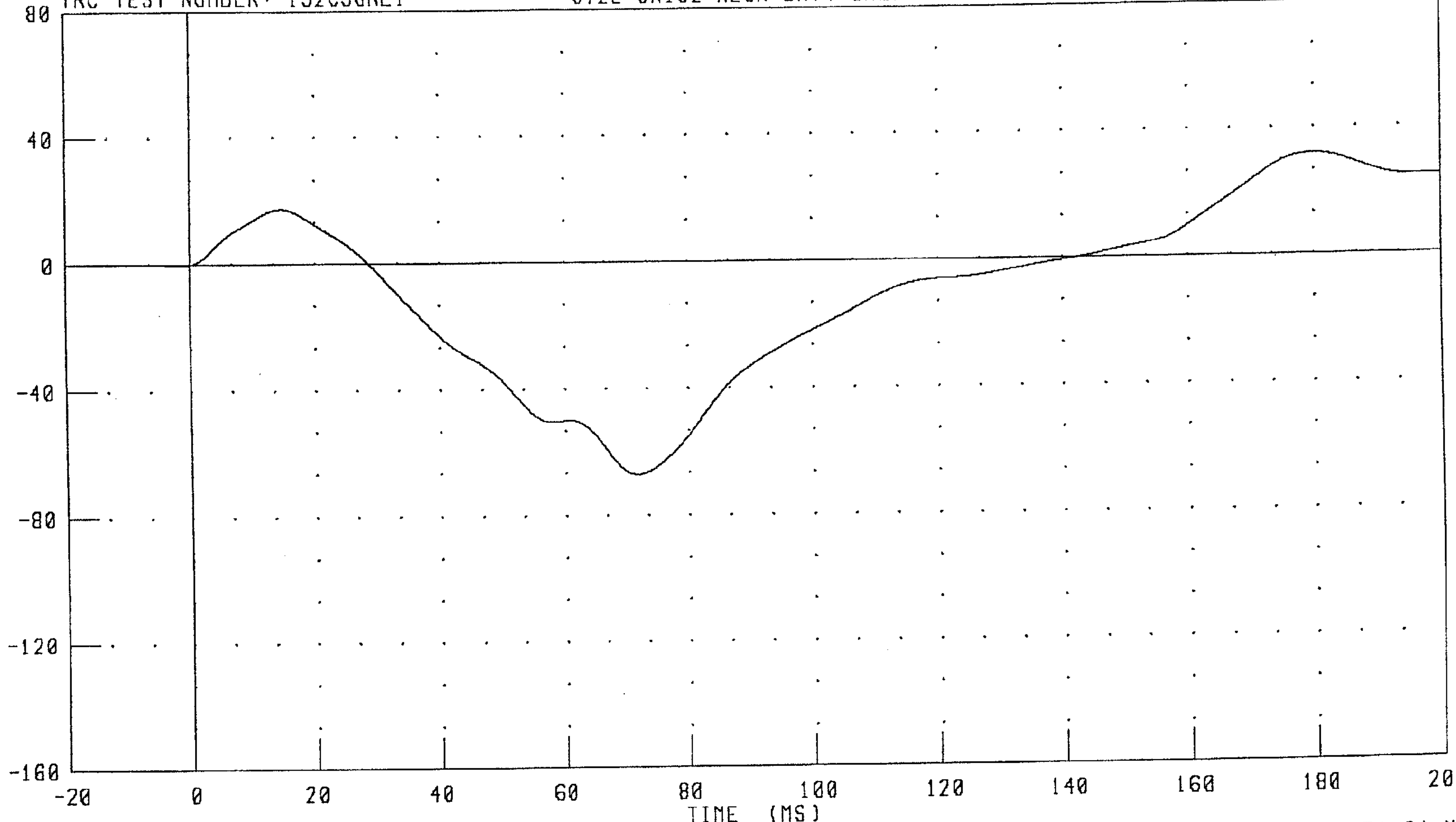
TRC TEST NUMBER: 192C38NE1 572E SN192 NECK EXT. CAL38 RUN NUMBER: 020998.1227;1



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 27.76 N·M @ 179.52 MS; -58.34 N·M @ 71.52 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 192C38NE1 572E SN192 NECK EXT. CAL38 RUN NUMBER: 020998.1227;1



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 31.78 N·M @ 180.08 MS; -67.33 N·M @ 71.84 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

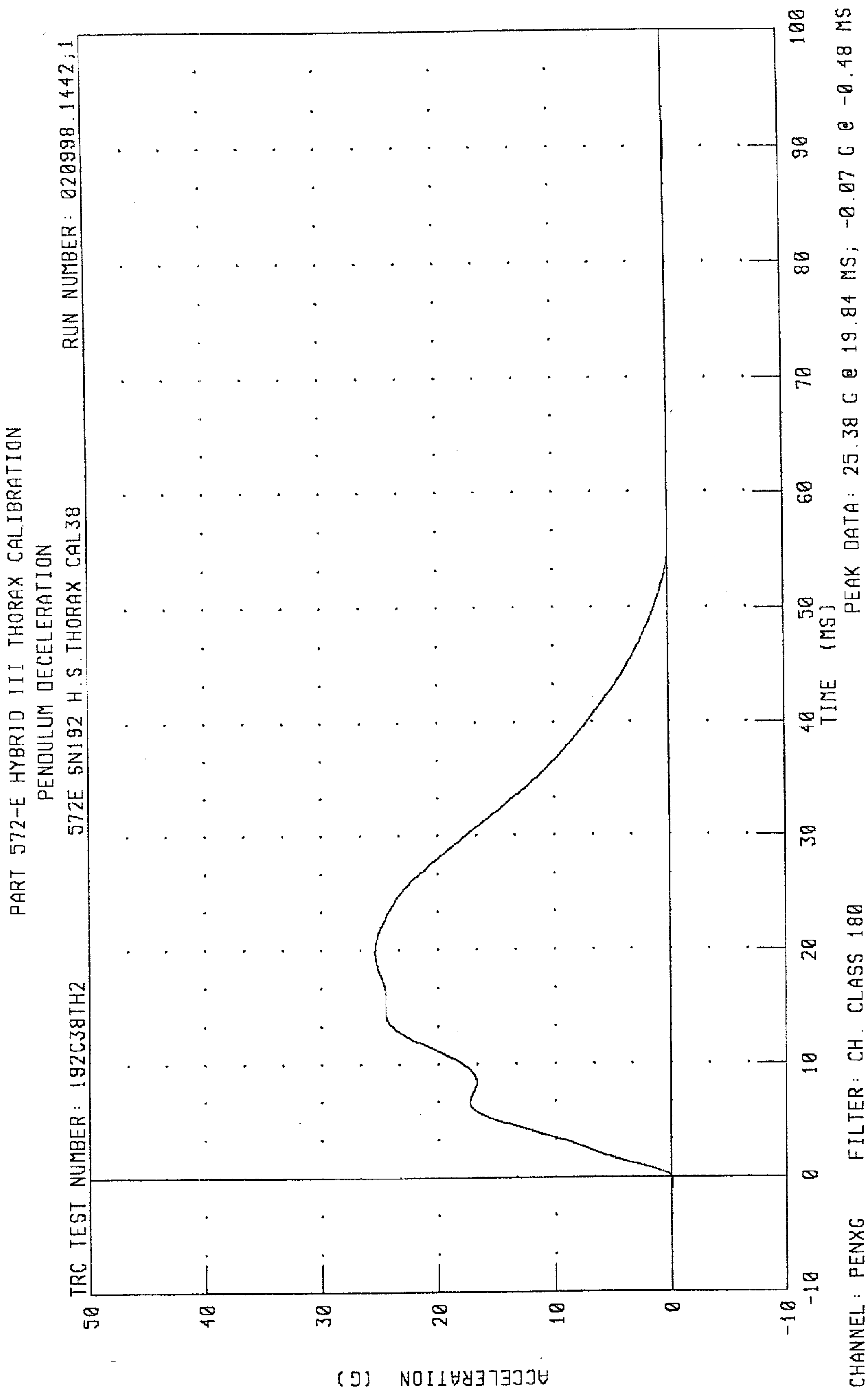
HYBRID III 50th 09-FEB-98

TRC INC. TEST NO: 192C38TH2 572E SN192 H.S.THORAX CAL38

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.65 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	67.4 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5814. N
INTERNAL HYSTERESIS	69% - 85%	72.1%

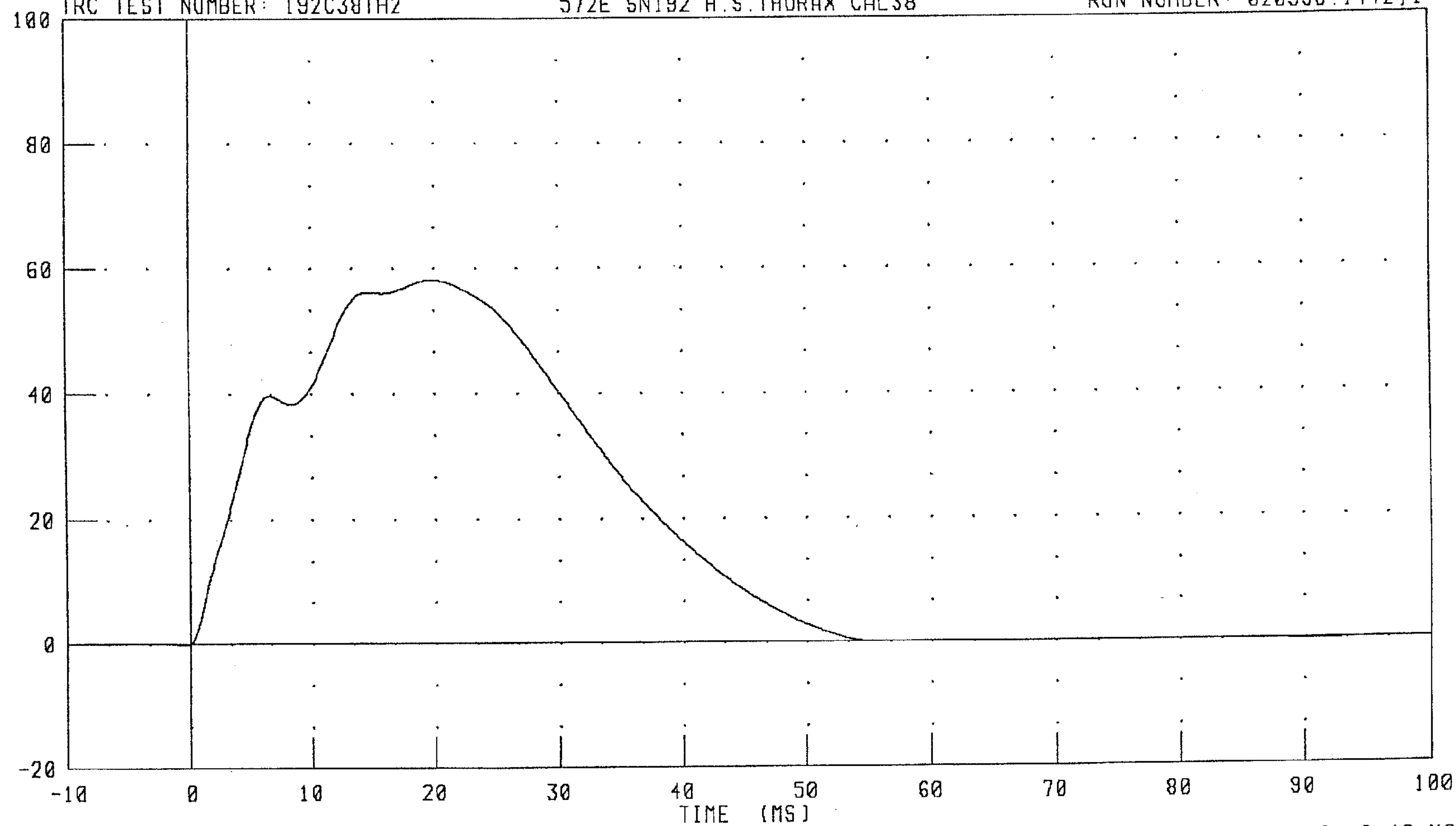
TEST MEETS SPECIFICATIONS

TECHNICIAN Bry Colt RUN NUMBER: 020998.1442;1


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION
572E SN192 H.S THORAX CAL38
TRC TEST NUMBER: 192C38TH2
RUN NUMBER: 020998.1442;1
50
40
30
20
10
0
-10
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 25.38 G @ 19.84 MS; -0.07 G @ -0.48 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

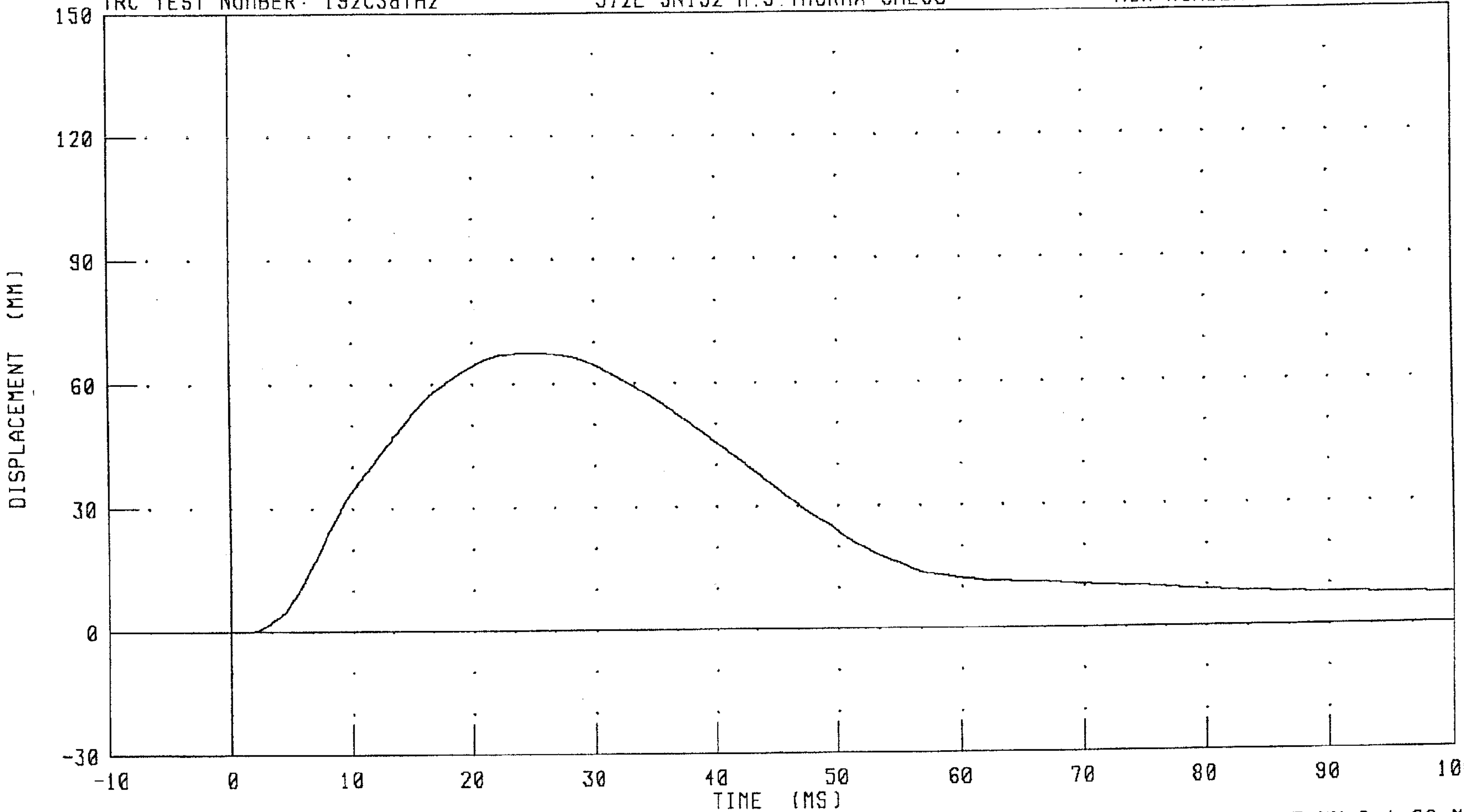
TRC TEST NUMBER: 192C38TH2 572E SN192 H.S.THORAX CAL38 RUN NUMBER: 020998.1442;1



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 5814.99 N @ 19.84 MS; -17.04 N @ -0.48 MS

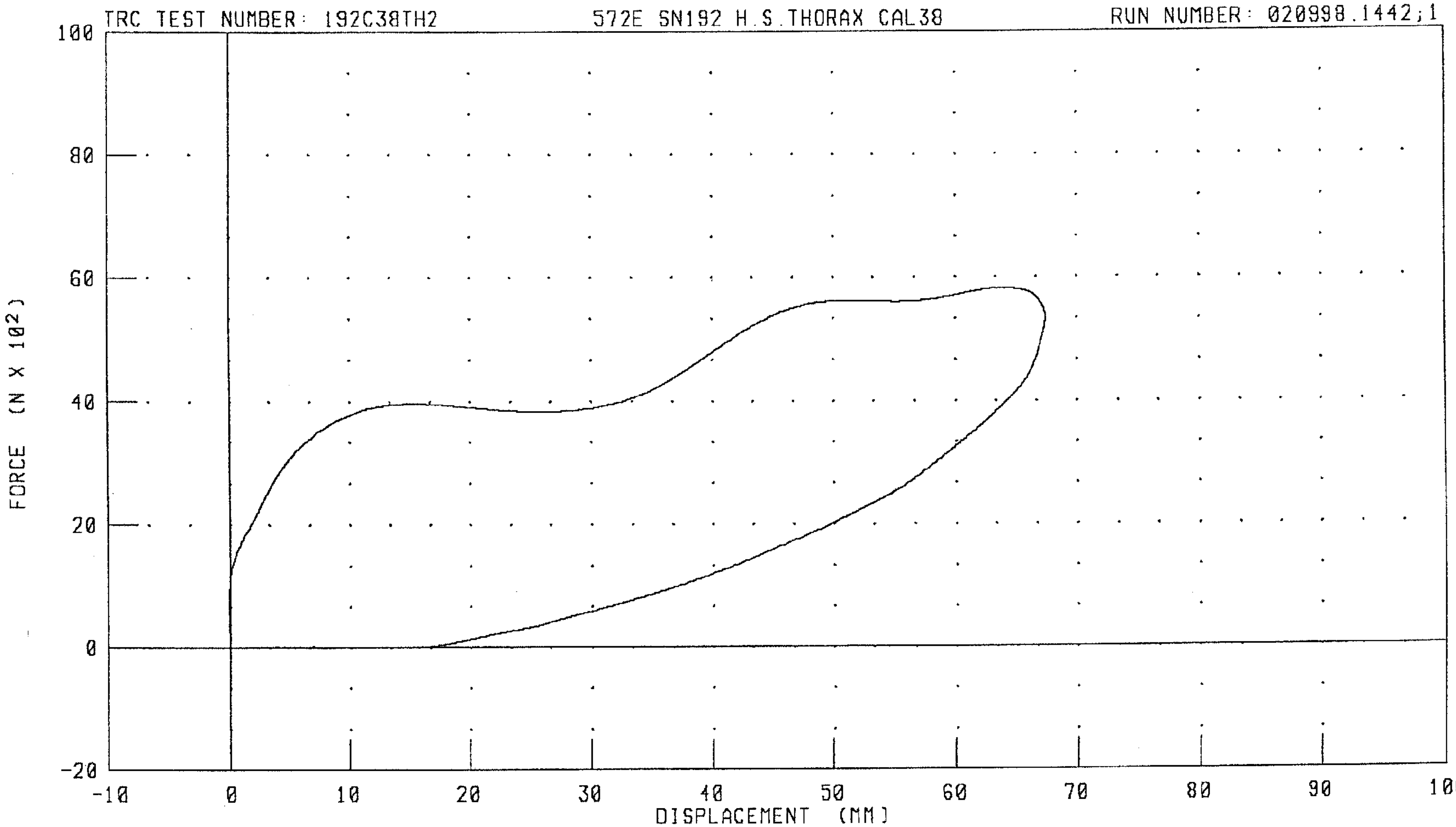
PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 192C38TH2 572E SN192 H.S THORAX CAL38 RUN NUMBER: 020998.1442;1



CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 67.48 MM @ 24.72 MS; -0.05 MM @ 1.20 MS

PART 572-E HYBRID III THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE



CHANNEL: CSTXD FILTER: CH. CLASS 180
PENXF CH. CLASS 180

PEAK DATA: 67.48 MM @ 24.72 MS; -0.05 MM @ 1.20 MS
5814.99 N @ 19.84 MS; -17.04 N @ -0.48 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E 07-FEB-98

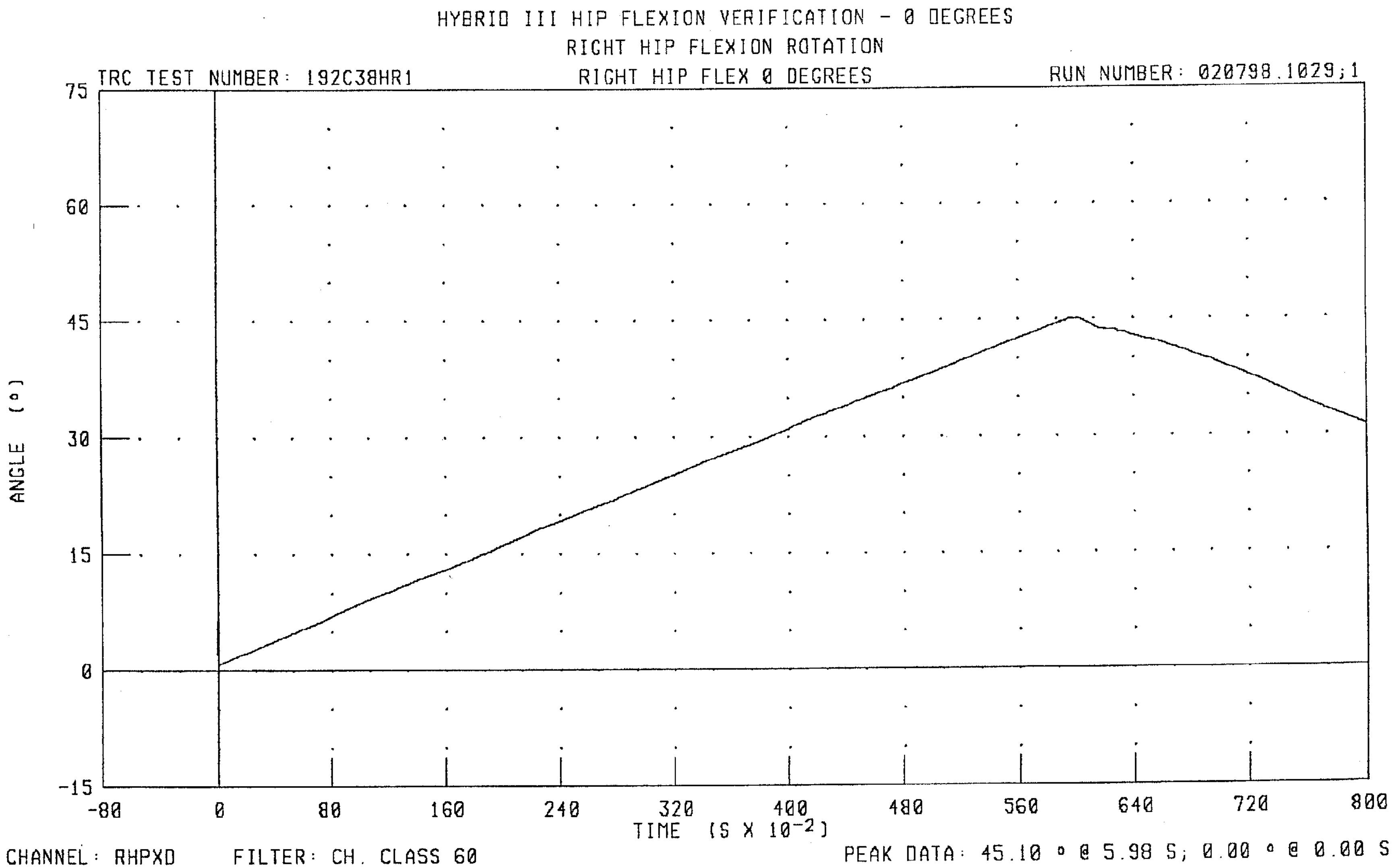
TRC INC. TEST NO: 192C38HR1 RIGHT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	76.6 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	44.3 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claudge

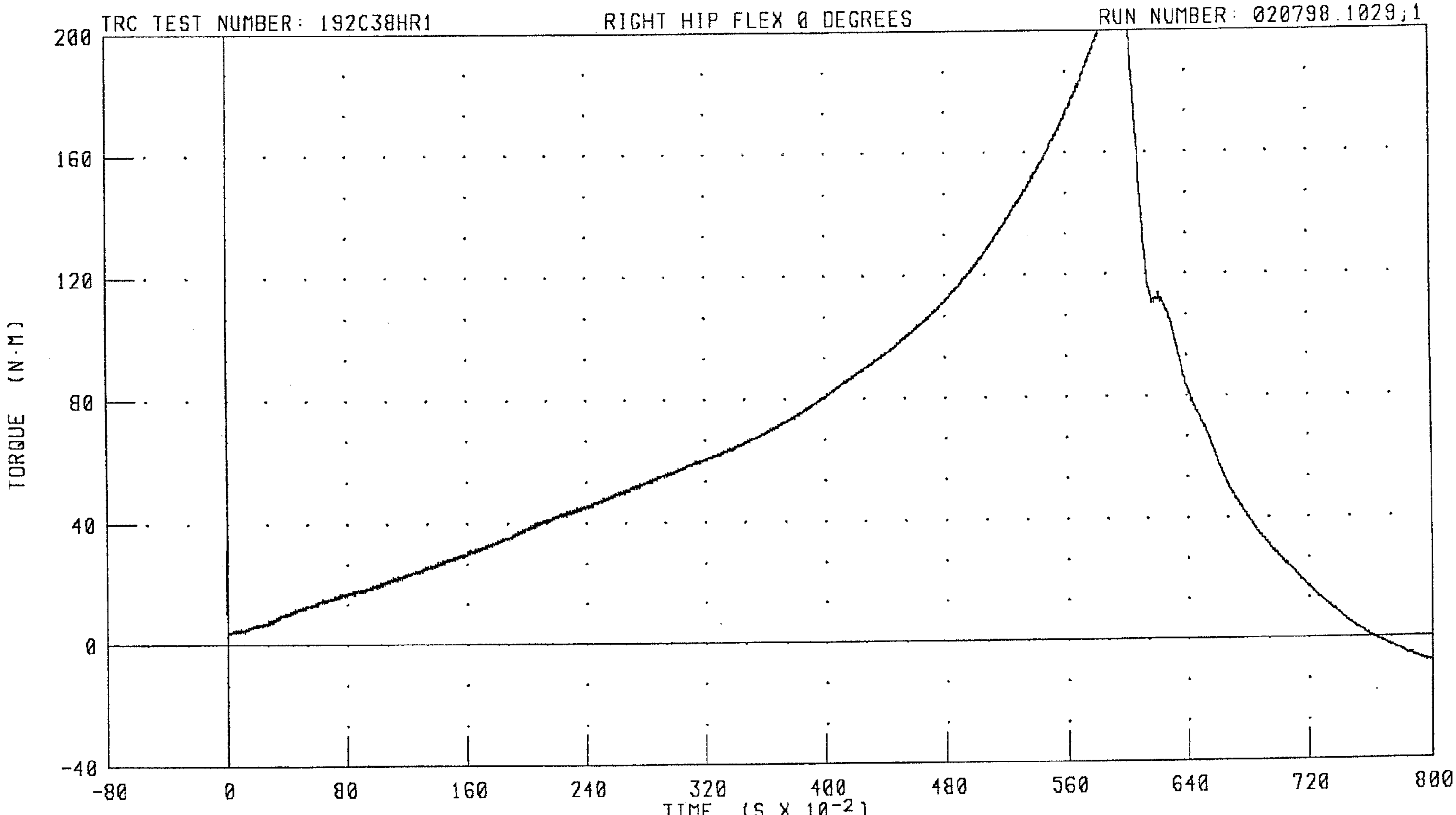
RUN NUMBER: 020798.1028;1


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION ROTATION
TRC TEST NUMBER: 192C38HR1
RIGHT HIP FLEX 0 DEGREES
RUN NUMBER: 020798.1029;1
75
60
45
30
15
0
-15
ANGLE (°)
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10^-2)
CHANNEL: RHPXD
FILTER: CH. CLASS 60
PEAK DATA: 45.10 ° @ 5.98 S; 0.00 ° @ 0.00 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION MOMENT

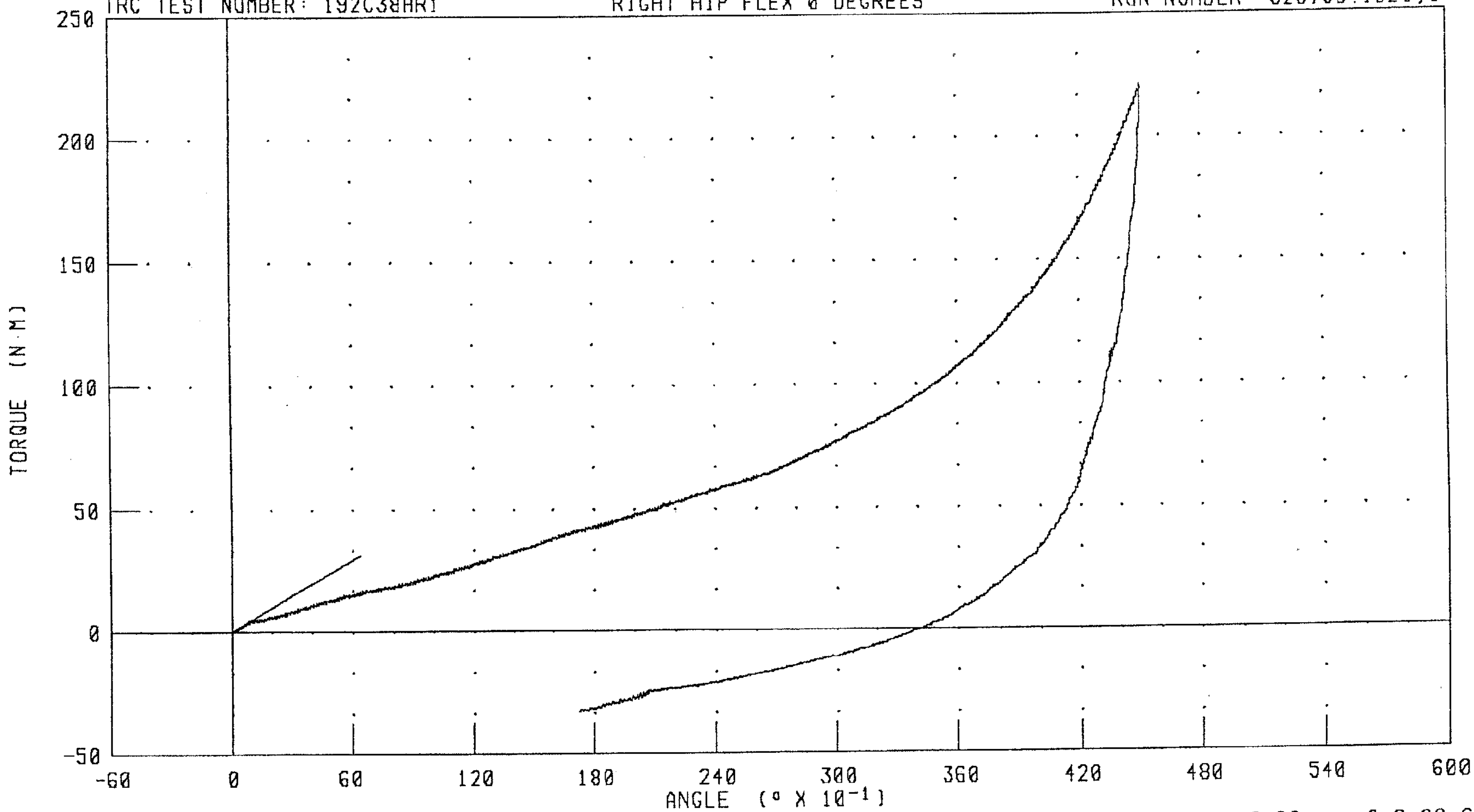
RIGHT HIP FLEX 0 DEGREES



CHANNEL: RHPYM FILTER: CH. CLASS 60 PEAK DATA: 220.89 N·M @ 5.97 S; -33.03 N·M @ 9.99 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION MOMENT VS ROTATION ANGLE

TRC TEST NUMBER: 192C38HR1 RIGHT HIP FLEX 0 DEGREES RUN NUMBER: 020798.1029;1



CHANNEL: RHPXD FILTER: CH. CLASS 60
RHPYM CH. CLASS 60

PEAK DATA: 45.10 ° @ 5.98 S; 0.00 ° @ 0.00 S
220.89 N·M @ 5.97 S; -33.03 N·M @ 9.99 S

TRANSPORTATION RESEARCH CENTER INC.

LEFT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E 07-FEB-98

TRC INC. TEST NO: 192C38HL1 LEFT HIP FLEX 0 DEGREES

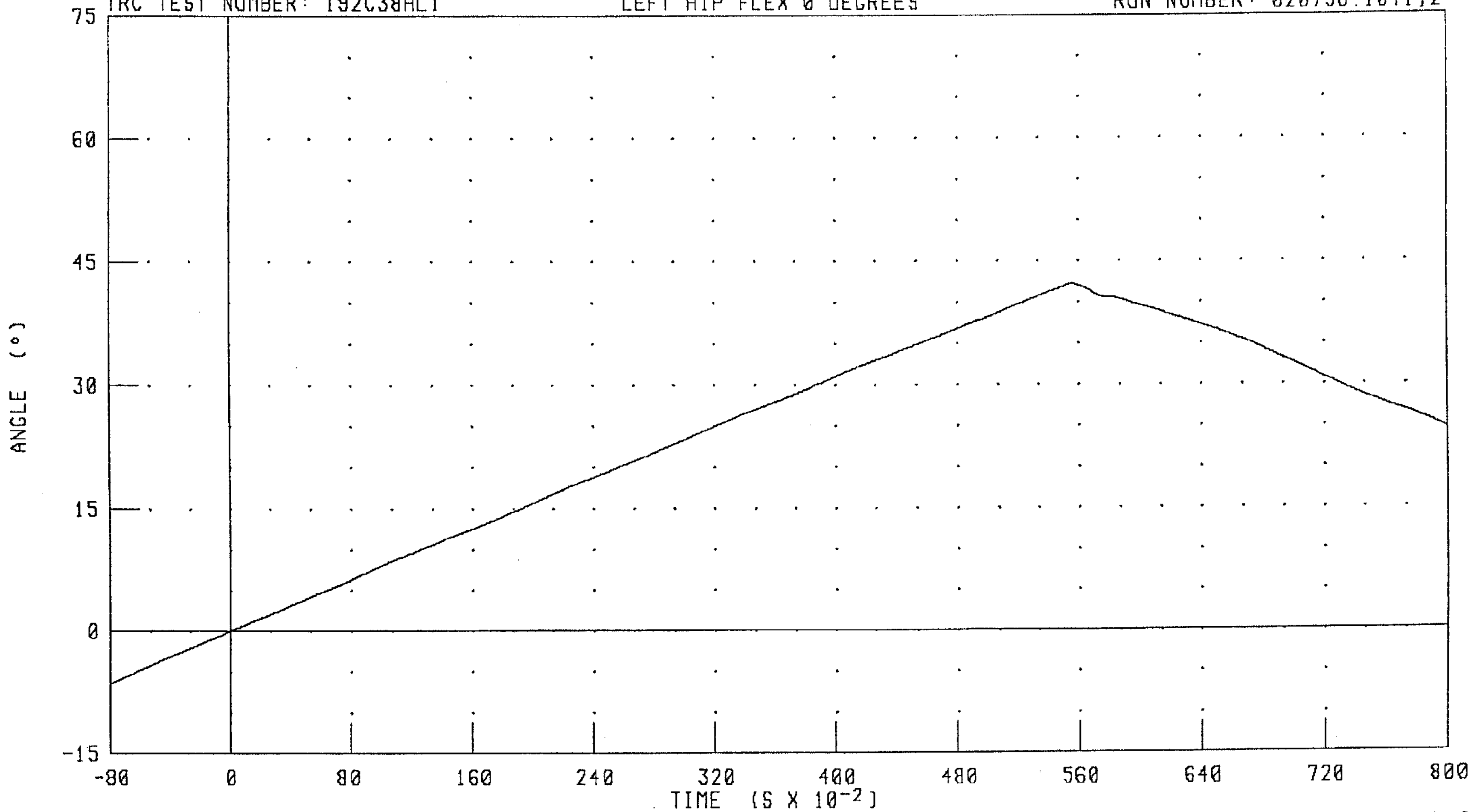
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	76.8 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	41.5 deg.

TEST MEETS SPECIFICATIONS

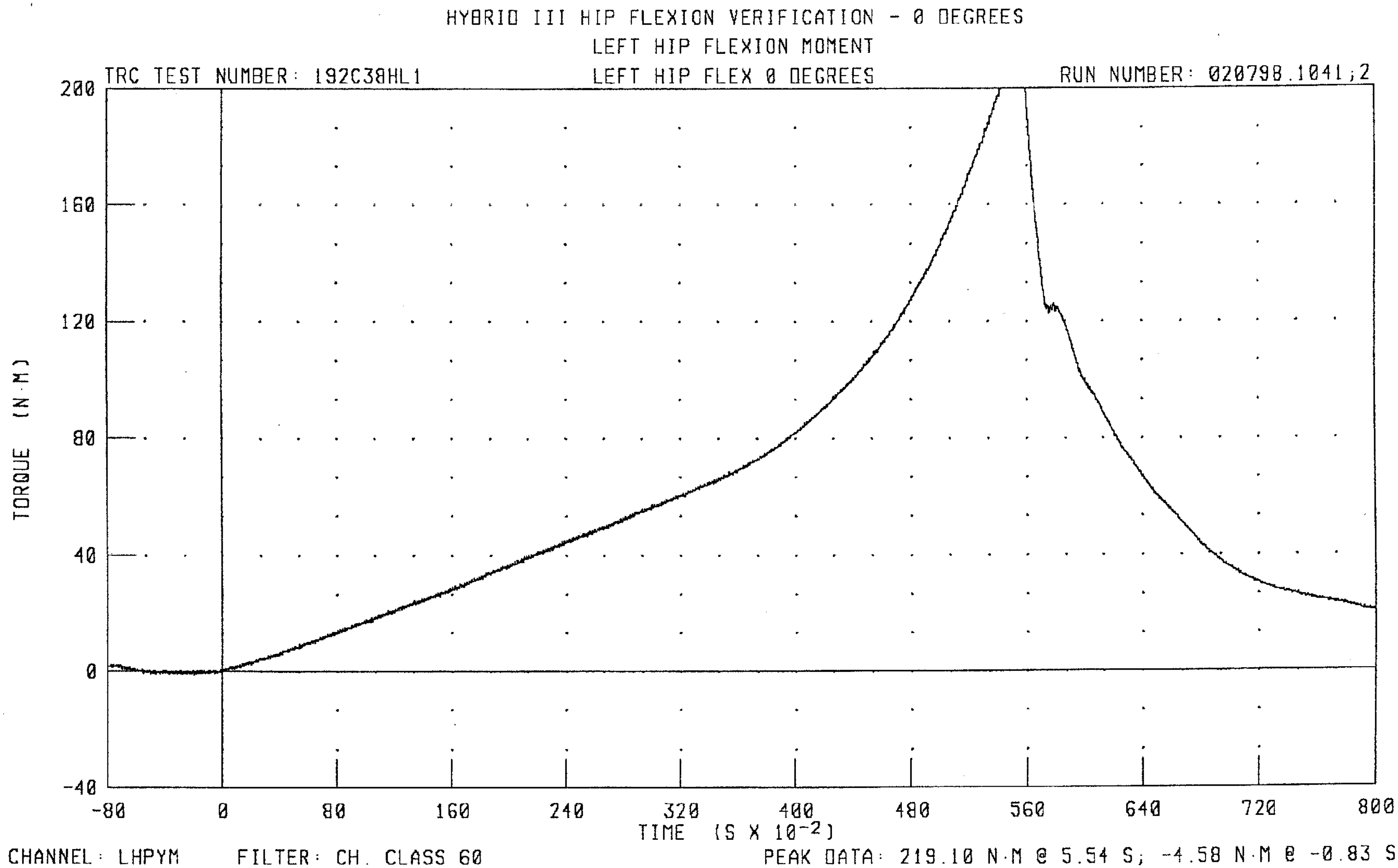
TECHNICIAN John K. Claridge RUN NUMBER: 020798.1040;2

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION ROTATION

TRC TEST NUMBER: 192C38HL1 LEFT HIP FLEX 0 DEGREES RUN NUMBER: 020798.1041;2



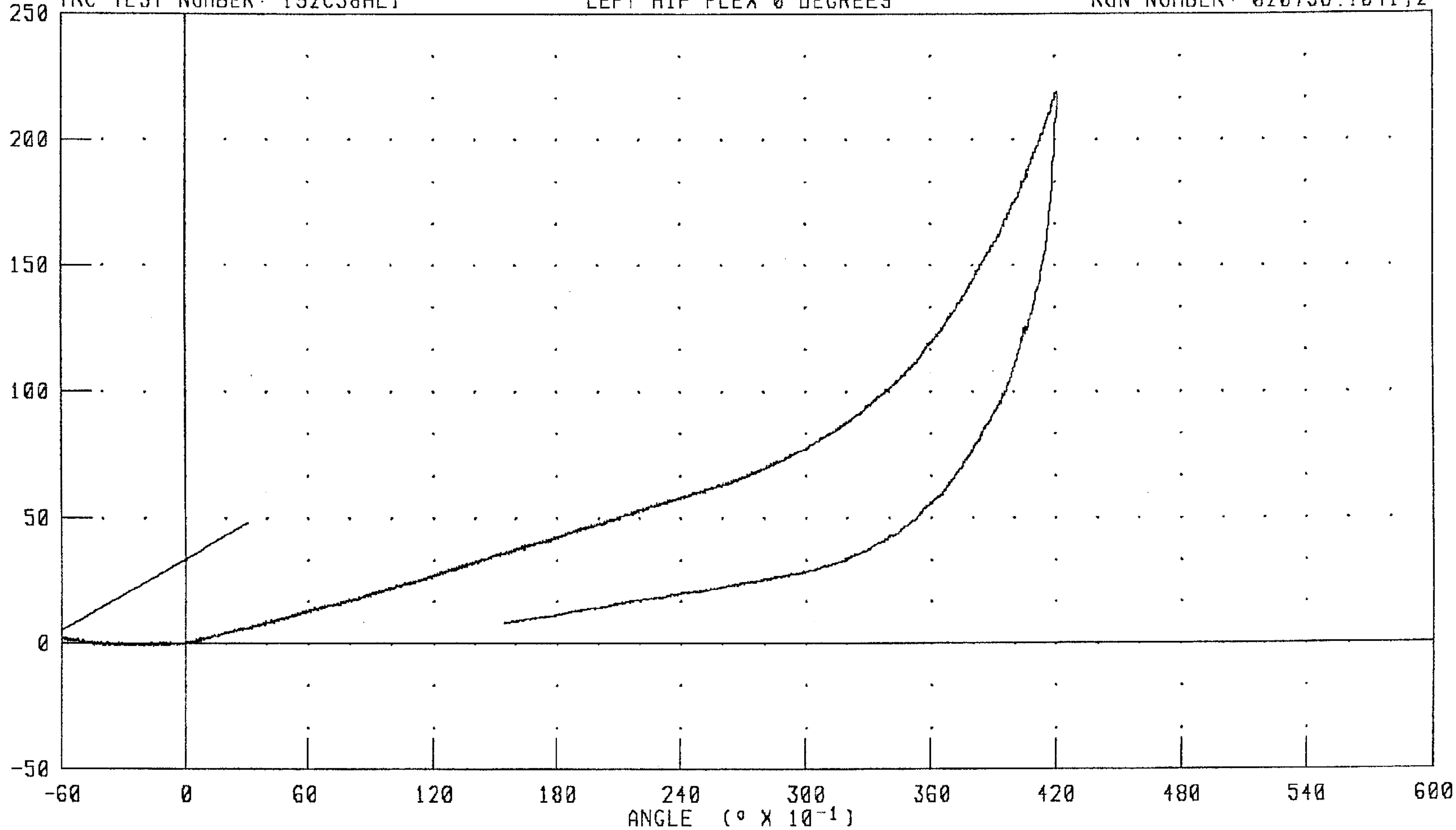
CHANNEL: LHPXD FILTER: CH. CLASS 60 PEAK DATA: 42.19 ° @ 5.55 S; -8.10 ° @ -0.83 S


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT
TRC TEST NUMBER: 192C38HL1
LEFT HIP FLEX 0 DEGREES
RUN NUMBER: 020798.1041;2
200
160
120
80
40
0
-40
TORQUE (N·M)
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10^-2)
CHANNEL: LHPYM
FILTER: CH. CLASS 60
PEAK DATA: 219.10 N·M @ 5.54 S; -4.58 N·M @ -0.83 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

LEFT HIP FLEXION MOMENT VS ROTATION ANGLE

TRC TEST NUMBER: 192C38HL1 LEFT HIP FLEX 0 DEGREES RUN NUMBER: 020798.1041;2



CHANNEL: LHPXD FILTER: CH. CLASS 60
LHPYM CH. CLASS 60

PEAK DATA: 42.19 ° @ 5.55 S; -8.10 ° @ -0.83 S
219.10 N·M @ 5.54 S; -4.58 N·M @ -0.83 S

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

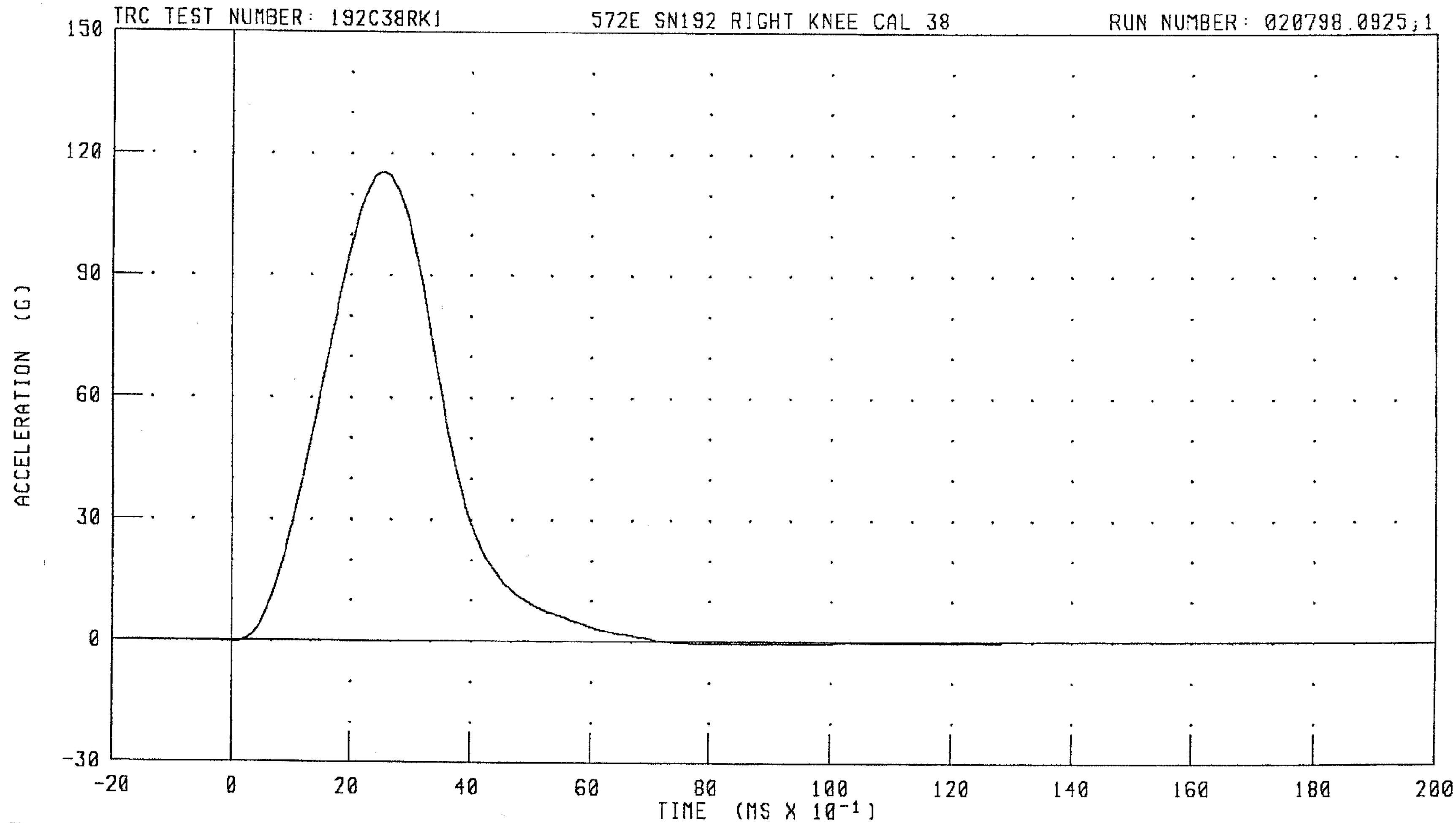
TRC INC. TEST NO: 192C38RK1 572E SN192 RIGHT KNEE CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5651.1 N

TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claridge RUN NUMBER: 020798.0924;1

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)



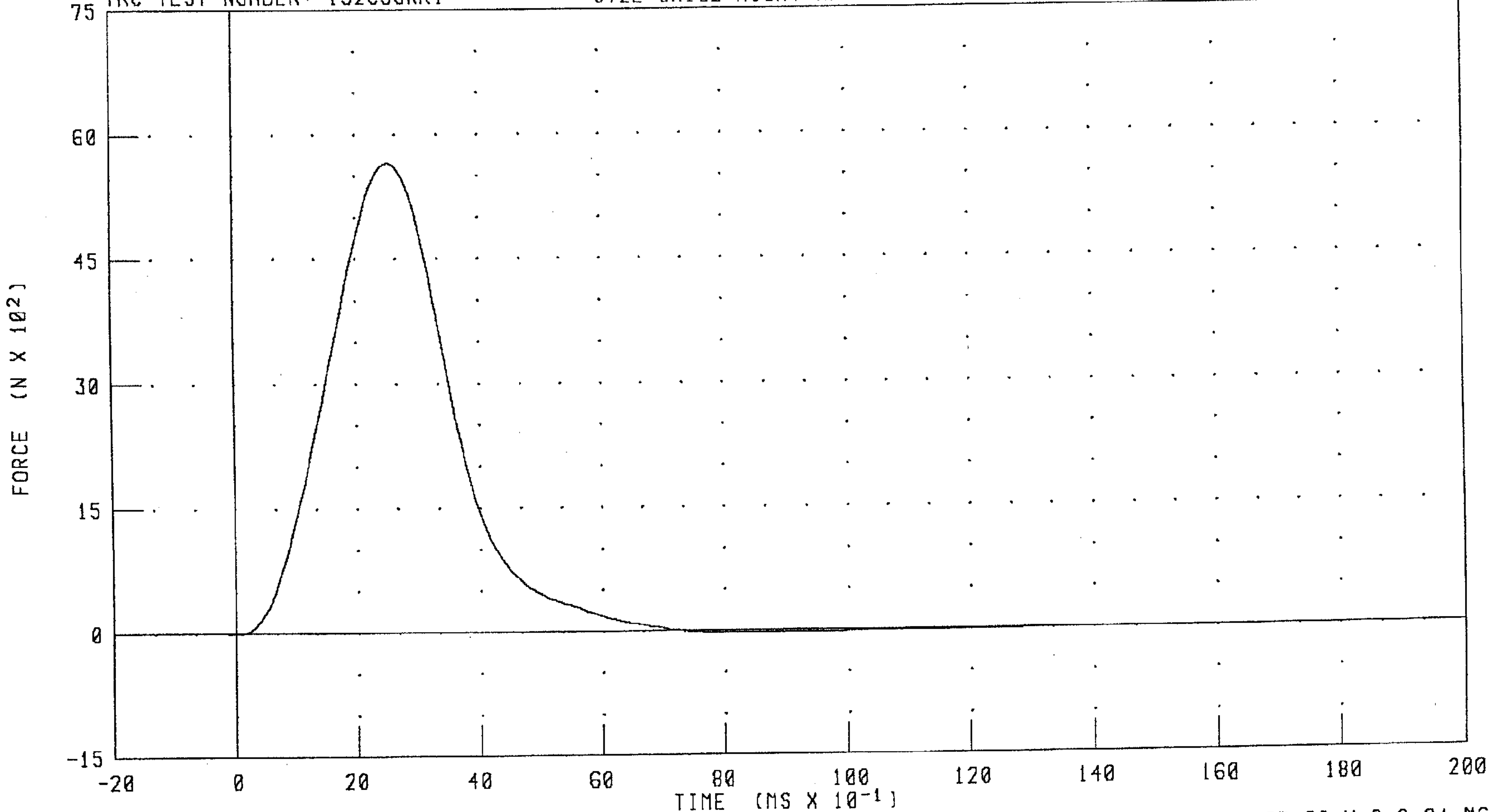
CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 115.50 G @ 2.56 MS; -0.48 G @ 8.64 MS

980221

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 192C38RK1 572E SN192 RIGHT KNEE CAL 38 RUN NUMBER: 020798.0925;1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 5651.14 N @ 2.56 MS; -23.26 N @ 8.64 MS

TRANSPORTATION RESEARCH CENTER INC.

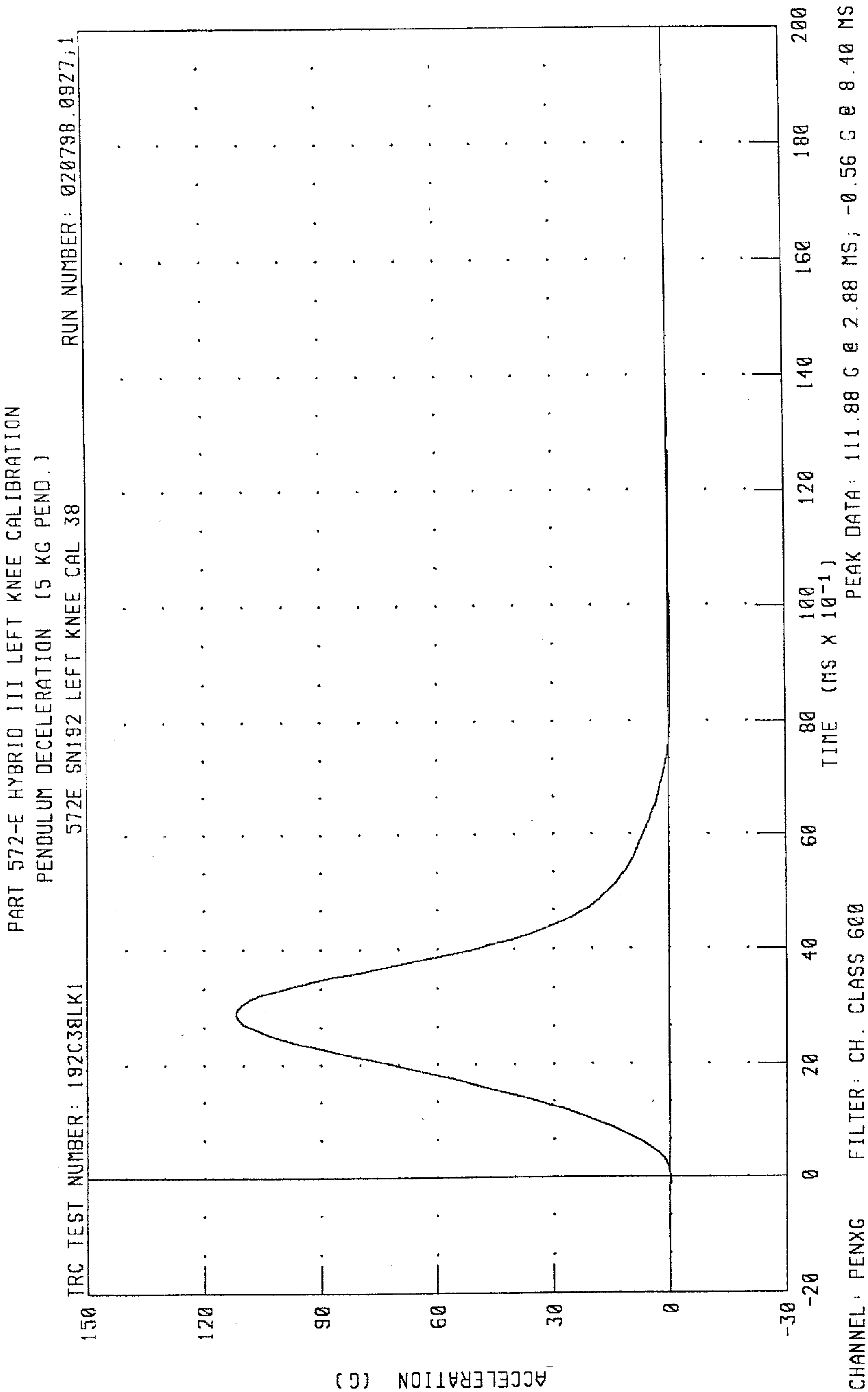
LEFT KNEE IMPACT TEST

TRC INC.   TEST NO: 192C38LK1   572E SN192 LEFT KNEE CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5473.9 N

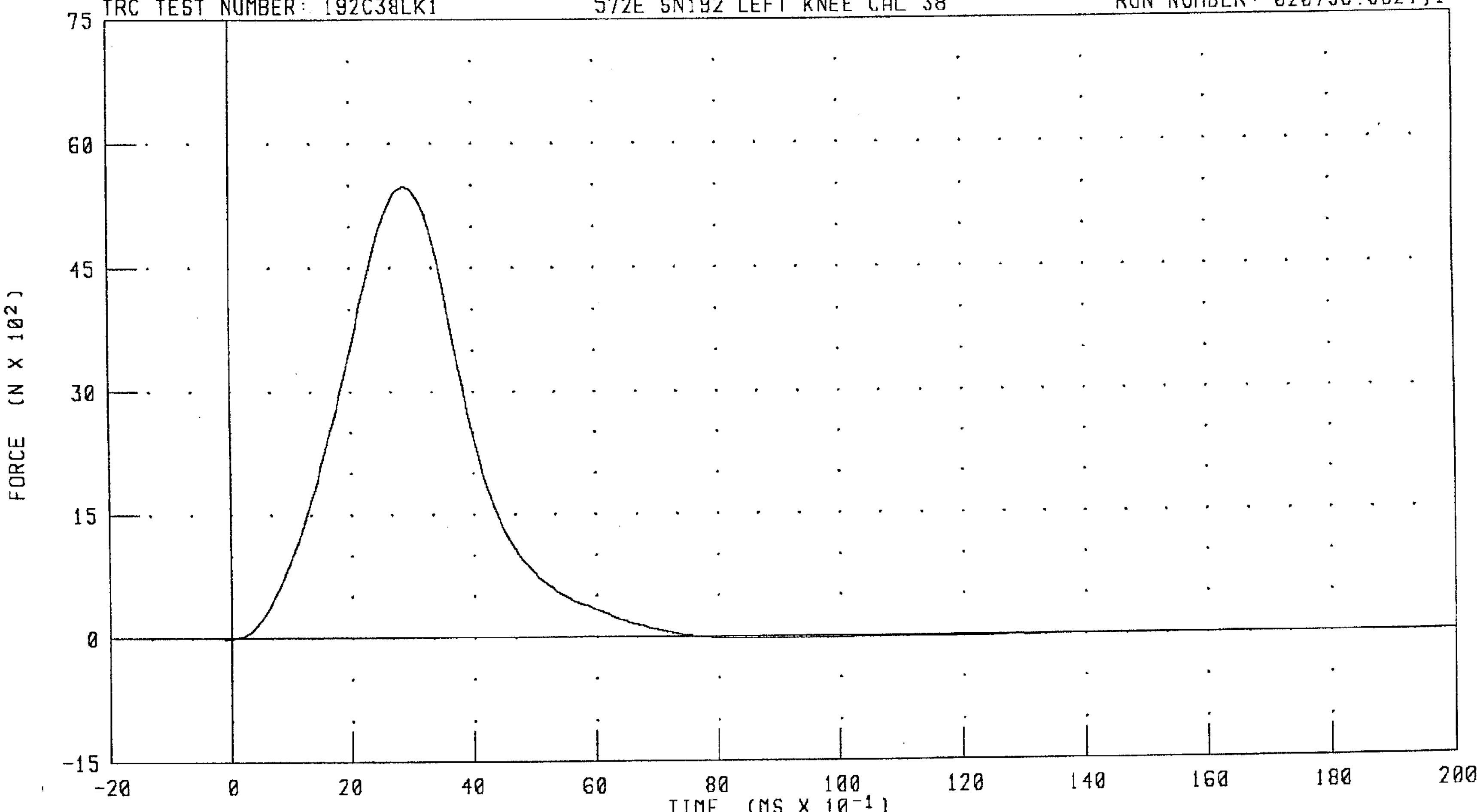
TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claridge   RUN NUMBER: 020798.0920;1


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)
572E SN192 LEFT KNEE CAL 38
TRC TEST NUMBER: 192C38LK1
RUN NUMBER: 020798.0927;1
ACCELERATION (G)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10-1)
CHANNEL: PENXG
FILTER: CH. CLASS 600
PEAK DATA: 111.88 G @ 2.88 MS; -0.56 G @ 8.40 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 192C38LK1 572E SN192 LEFT KNEE CAL 38 RUN NUMBER: 020798.0927;1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 5473.93 N @ 2.88 MS; -27.50 N @ 8.40 MS

Pre-test Certification Data

Passenger Dummy S/N: 142

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
SN142 HUMANOID 07-02-98

TRC INC. TEST NO: 142C39ED1 572E SN142 EXT.DIMENSION CAL39

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE	(AA)	429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE	(BB)	226 - 231 MM	229. MM
CHEST CIRCUMFERENCE	(Y)	970 -1001 MM	983. MM
WAIST CIRCUMFERENCE	(Z)	836 - 866 MM	848. MM
CHEST DEPTH	(O)	213 - 229 MM	218. MM
H-POINT HEIGHT	(C)	84 - 89 MM	86. MM
H-POINT FROM SEATBACK	(D)	135 - 140 MM	137. MM
SKULL CAP TO BACKLINE	(H)	41 - 46 MM	43. MM
TOTAL SITTING HEIGHT	(A)	879 - 889 MM	879. MM
THIGH CLEARANCE	(F)	140 - 155 MM	152. MM
BUTTOCK KNEE LENGTH	(K)	579 - 605 MM	582. MM
BUTTOCK POPLITEAL LENGTH	(N)	452 - 478 MM	455. MM
POPLITEAL HEIGHT	(L)	429 - 455 MM	442. MM
KNEE PIVOT HEIGHT	(M)	485 - 500 MM	495. MM
FOOT LENGTH	(P)	252 - 267 MM	257. MM
FOOT BREADTH	(W)	91 - 107 MM	99. MM
SHOULDER PIVOT FROM BACKLINE	(E)	84 - 94 MM	91. MM
SHOULDER BREADTH	(V)	422 - 437 MM	432. MM
SHOULDER PIVOT HEIGHT	(B)	506 - 521 MM	513. MM
ELBOW REST HEIGHT	(J)	191 - 211 MM	198. MM
SHOULDER-ELBOW LENGTH	(I)	330 - 345 MM	338. MM
BACK OF ELBOW TO WRIST PIVOT	(G)	290 - 305 MM	292. MM

DUMMY MEETS SPECIFICATIONS
TECHNICIAN [signature] RUN NUMBER: 030298.0925

TRANSPORTATION RESEARCH CENTER INC.

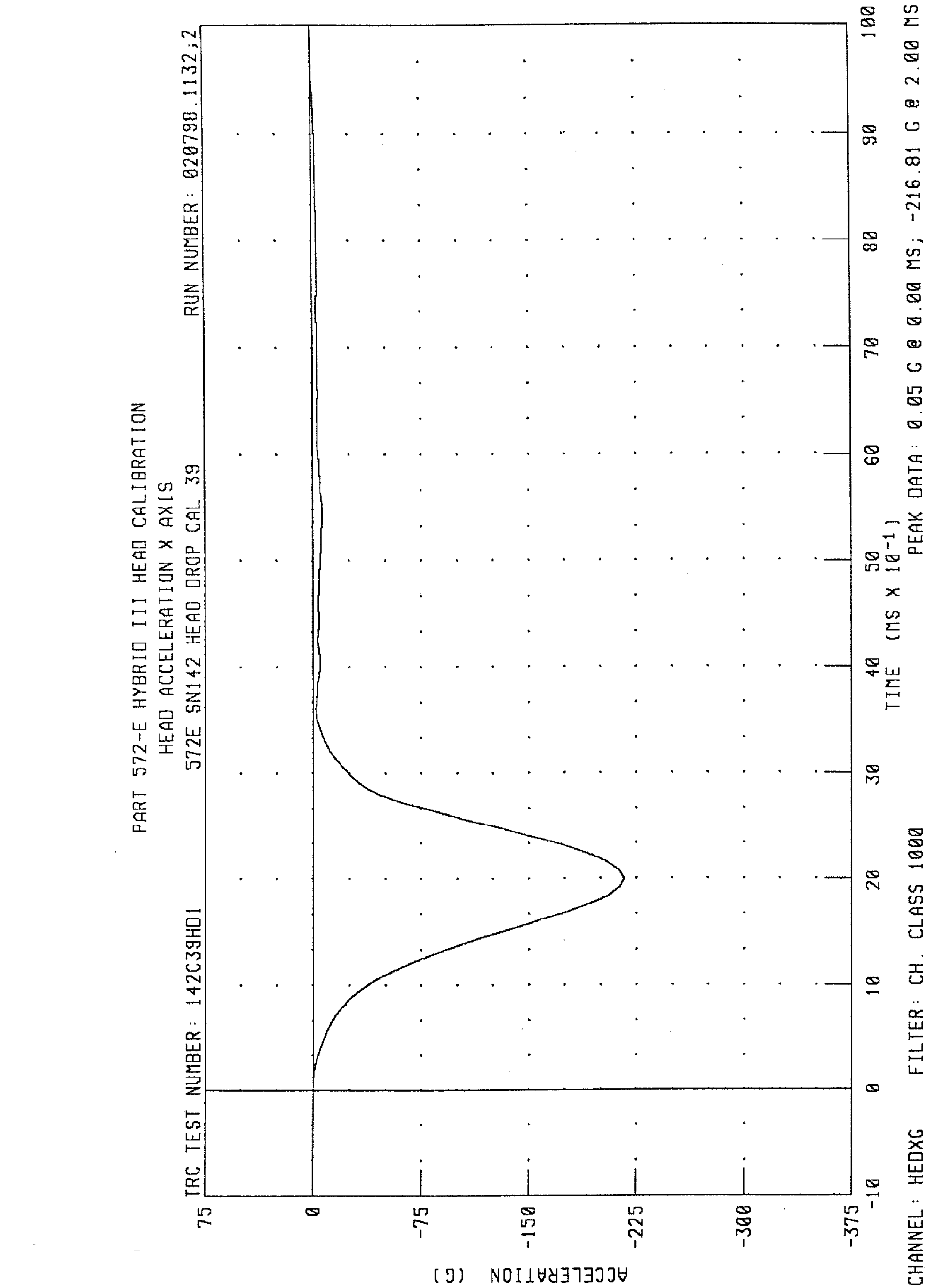
HEAD DROP TEST

TRC INC. TEST NO: 142C39HD1 572E SN142 HEAD DROP CAL 39

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	247.80 G
PEAK LATERAL ACCELERATION	15 G MAX	-6.55 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

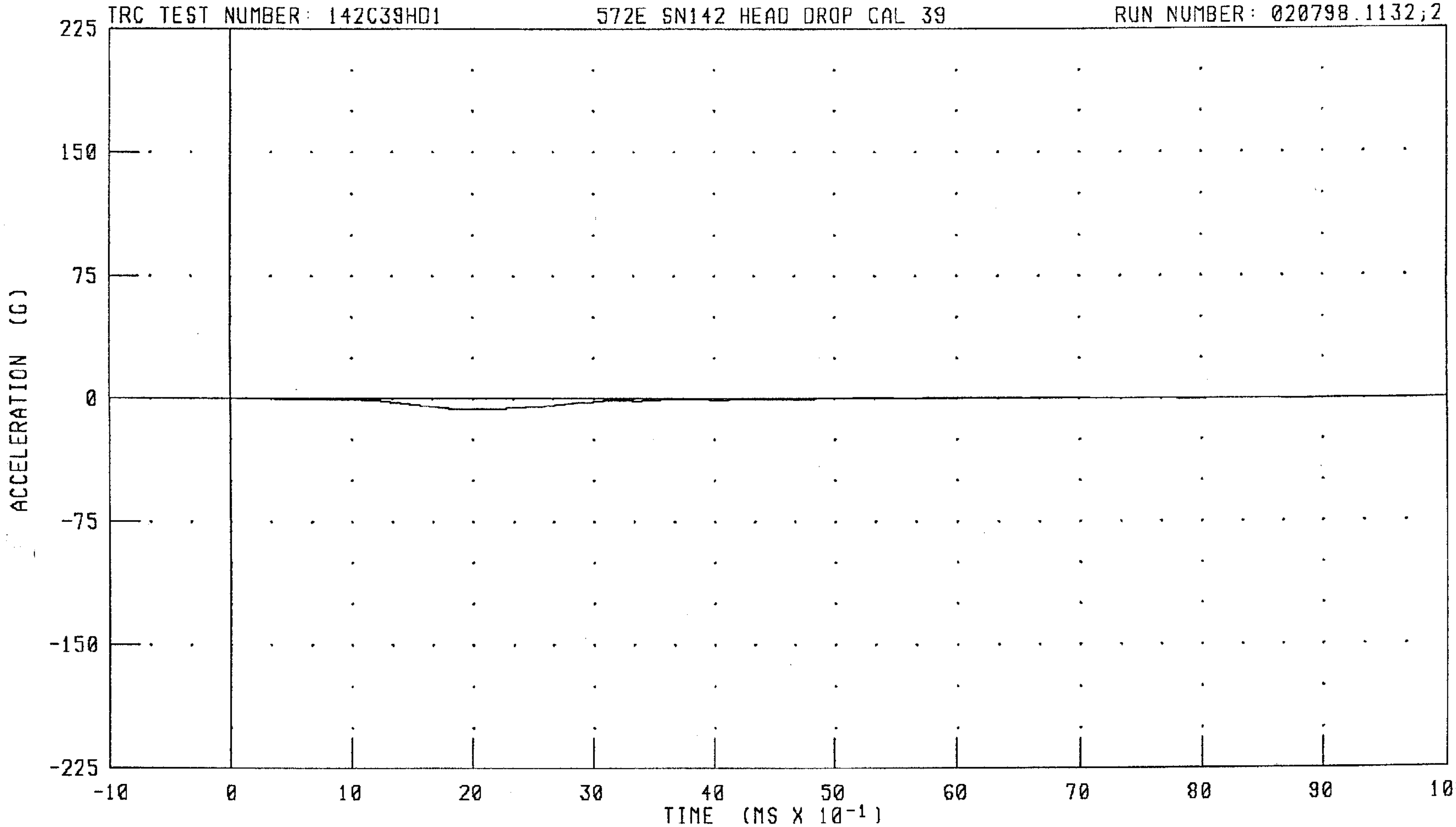
TECHNICIAN John K. Clawson RUN NUMBER: 020798.0917;1



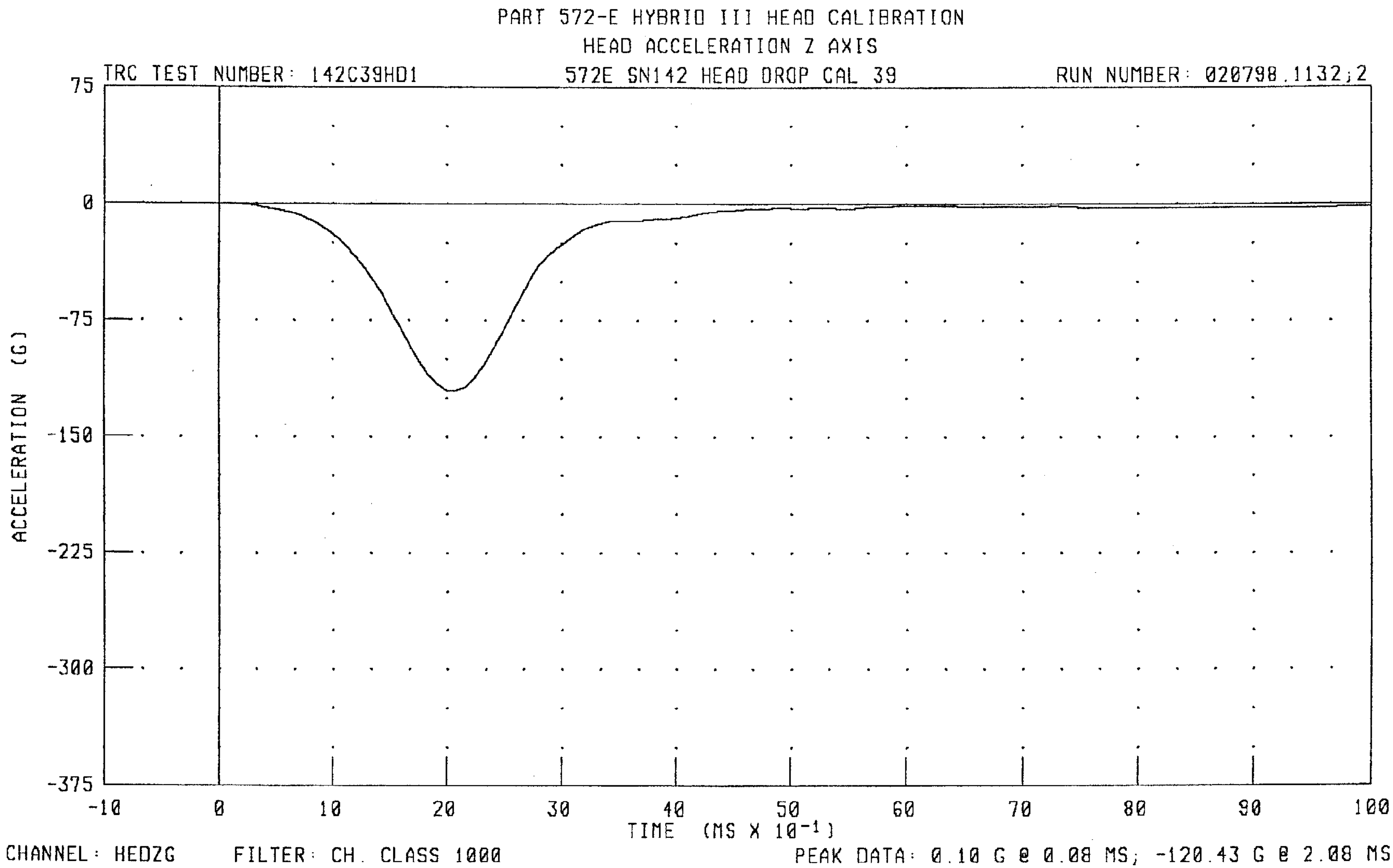
PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS
572E SN142 HEAD DROP CAL 39
TRC TEST NUMBER: 142C39HD1
RUN NUMBER: 020798.1132;2
ACCELERATION (G)
75
0
-75
-150
-225
-300
-375
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDXG
FILTER: CH. CLASS 1000
PEAK DATA: 0.05 G @ 0.00 MS; -216.81 G @ 2.00 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 142C39HD1   572E SN142 HEAD DROP CAL 39   RUN NUMBER: 020798.1132;2



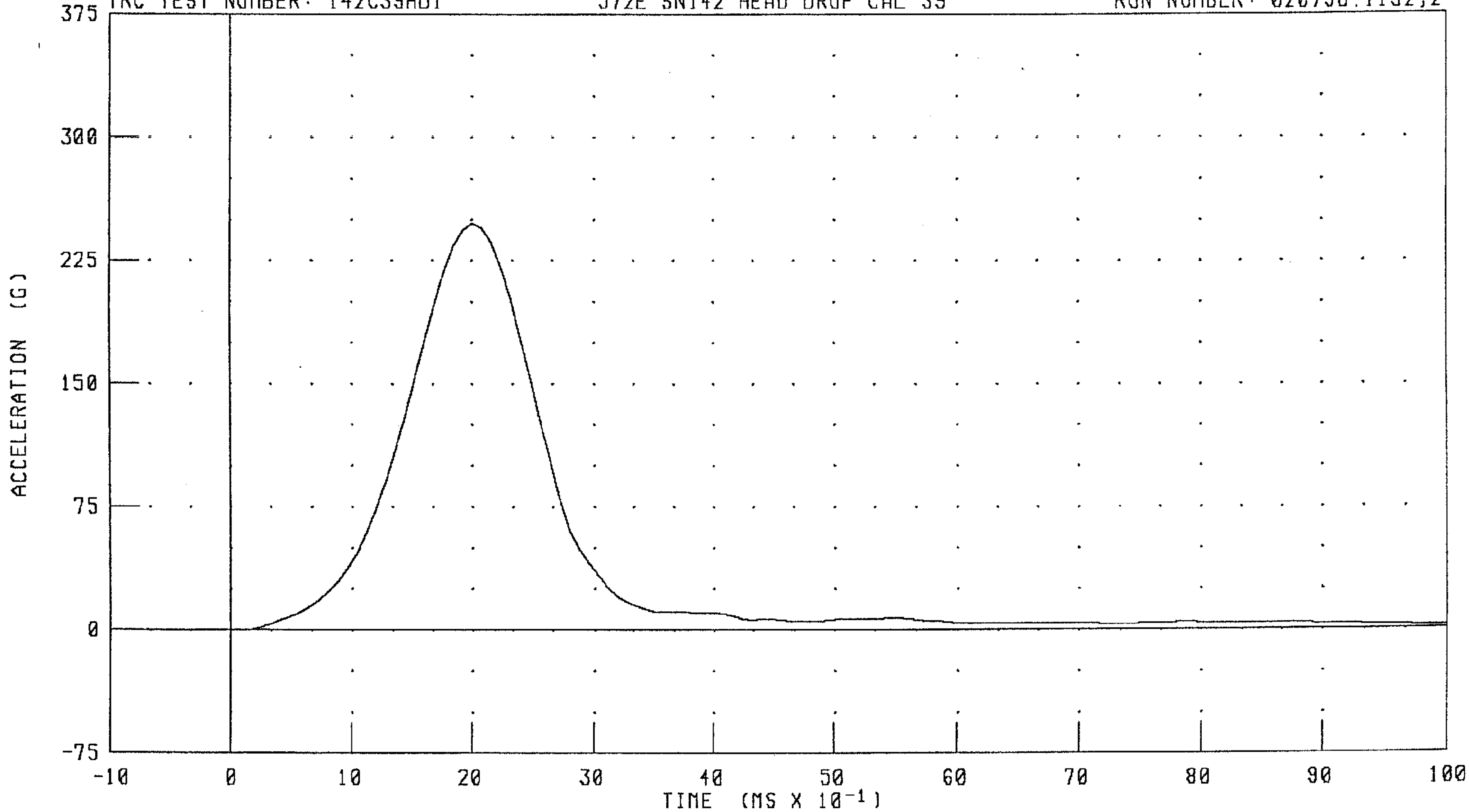
CHANNEL: HEDYG   FILTER: CH. CLASS 1000   PEAK DATA: 0.75 G @ 5.36 MS; -6.56 G @ 2.08 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 142C39HD1
572E SN142 HEAD DROP CAL 39
RUN NUMBER: 020798.1132;2
ACCELERATION (G)
75
0
-75
-150
-225
-300
-375
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDZG
FILTER: CH. CLASS 1000
PEAK DATA: 0.10 G @ 0.08 MS; -120.43 G @ 2.08 MS

980221

PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 142C39HD1 572E SN142 HEAD DROP CAL 39 RUN NUMBER: 020798.1132;2



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 247.80 G @ 2.00 MS; 0.05 G @ -0.08 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 142C39NF4 572E SN142 NECK FLEXION CAL39

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	37.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.50 G
	20 MS	17.60 - 22.60 G	21.59 G
	30 MS	12.50 - 18.50 G	17.89 G
MAX PENDULUM G		29 G MAX	22.56 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	17.82 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	39.20 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	73.58 DEG.
	TIME	57 - 64 MS	60.48 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	98.54 NM
	TIME	47 - 58 MS	53.28 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	117.60 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.80 MS

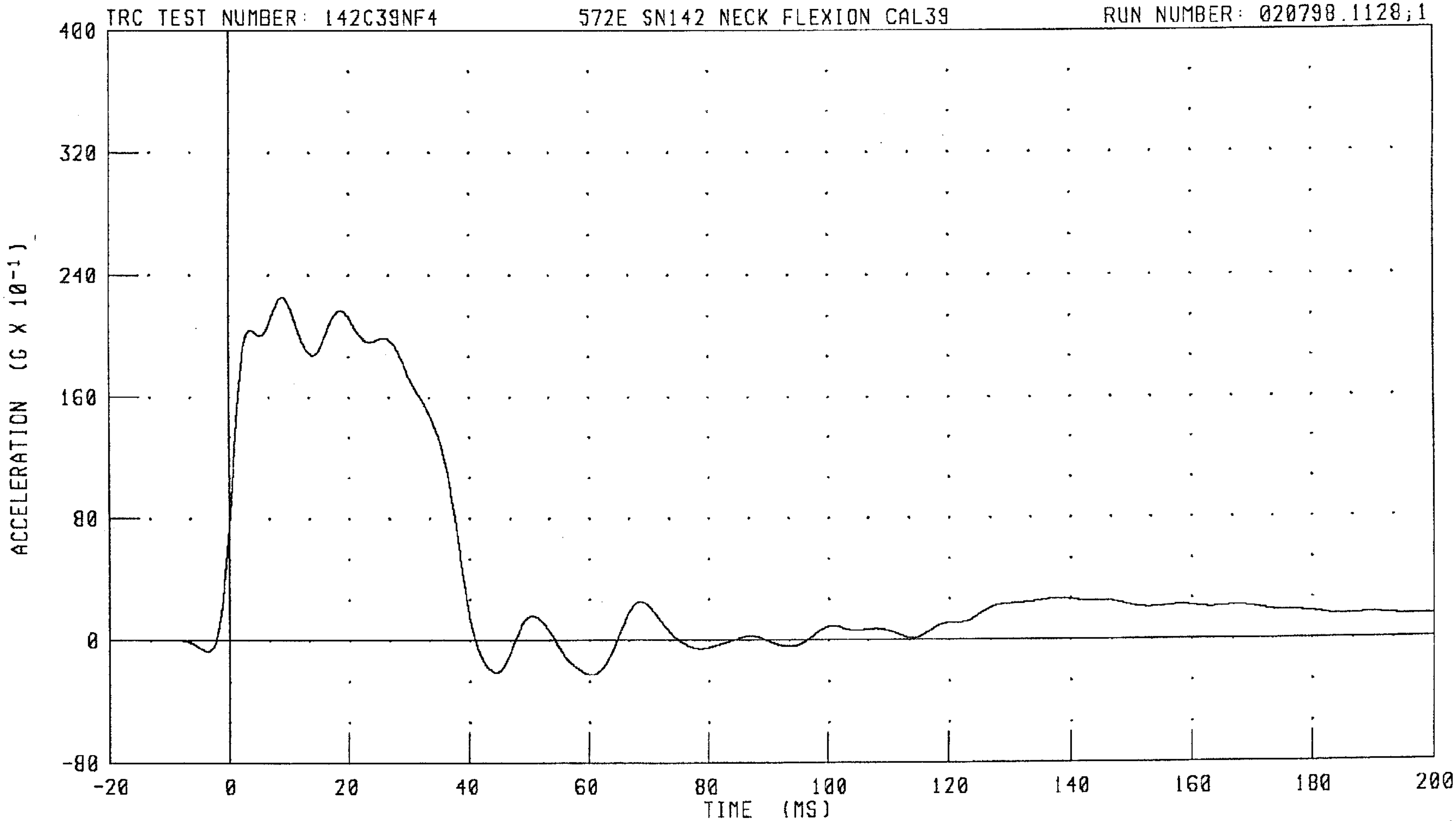
TEST MEETS SPECIFICATIONS

TECHNICIAN Bryan Colt

RUN NUMBER: 020798.1148;2

PART 572-E HYBRID III NECK FLEXION CALIBRATION

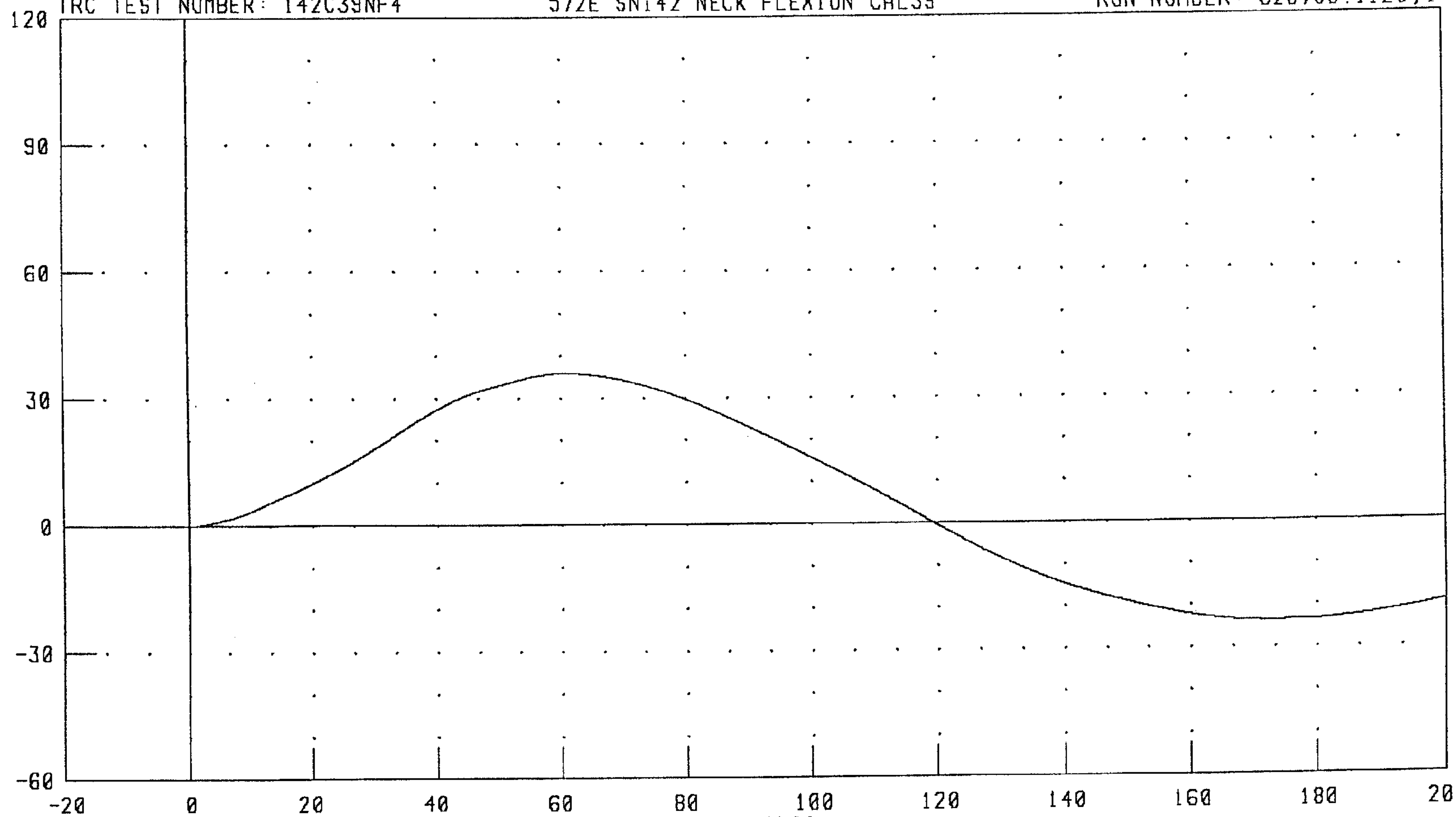
PENDULUM DECELERATION



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 22.57 G @ 8.96 MS; -2.23 G @ 60.48 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

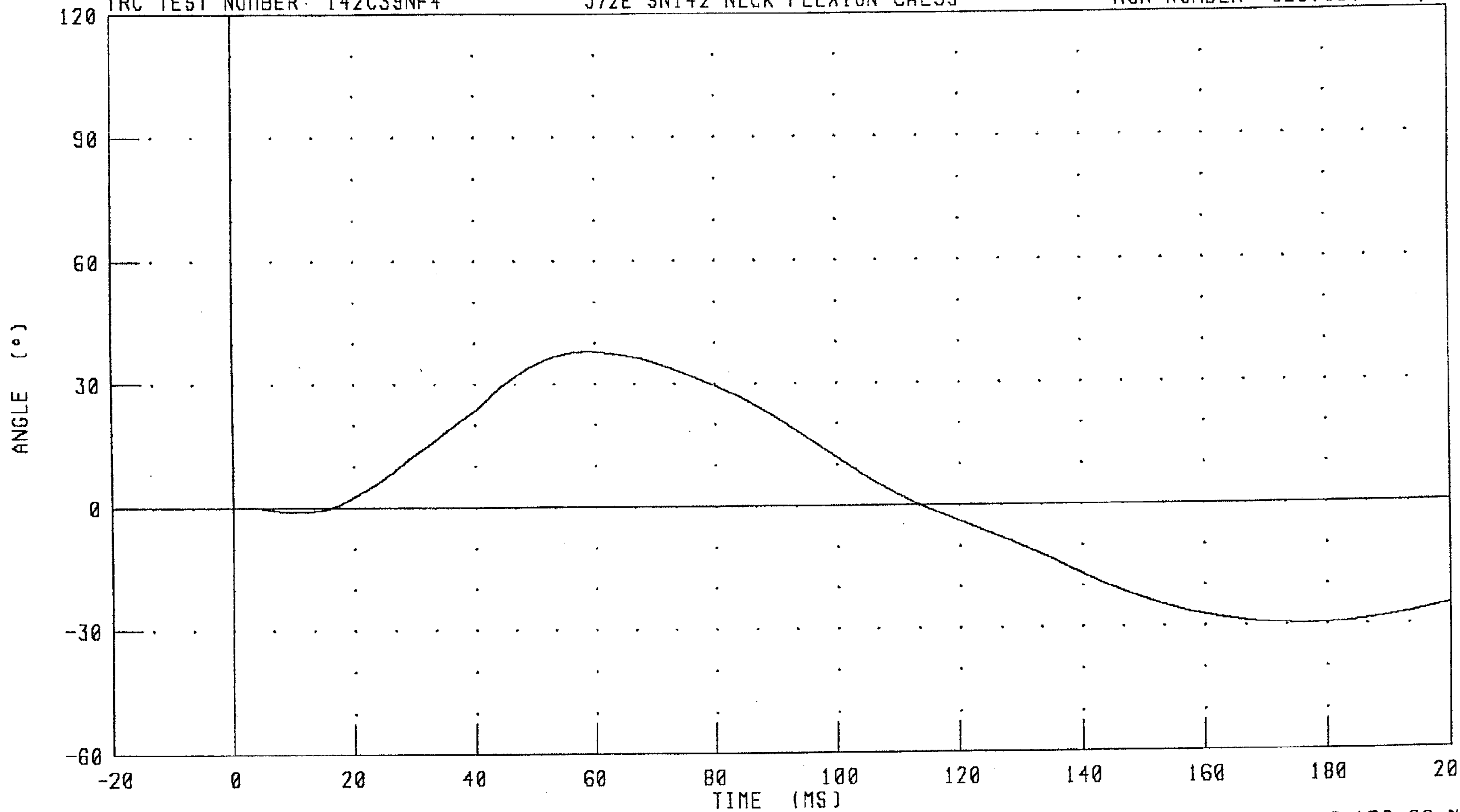
TRC TEST NUMBER: 142C39NF4 572E SN142 NECK FLEXION CAL39 RUN NUMBER: 020798.1128;1



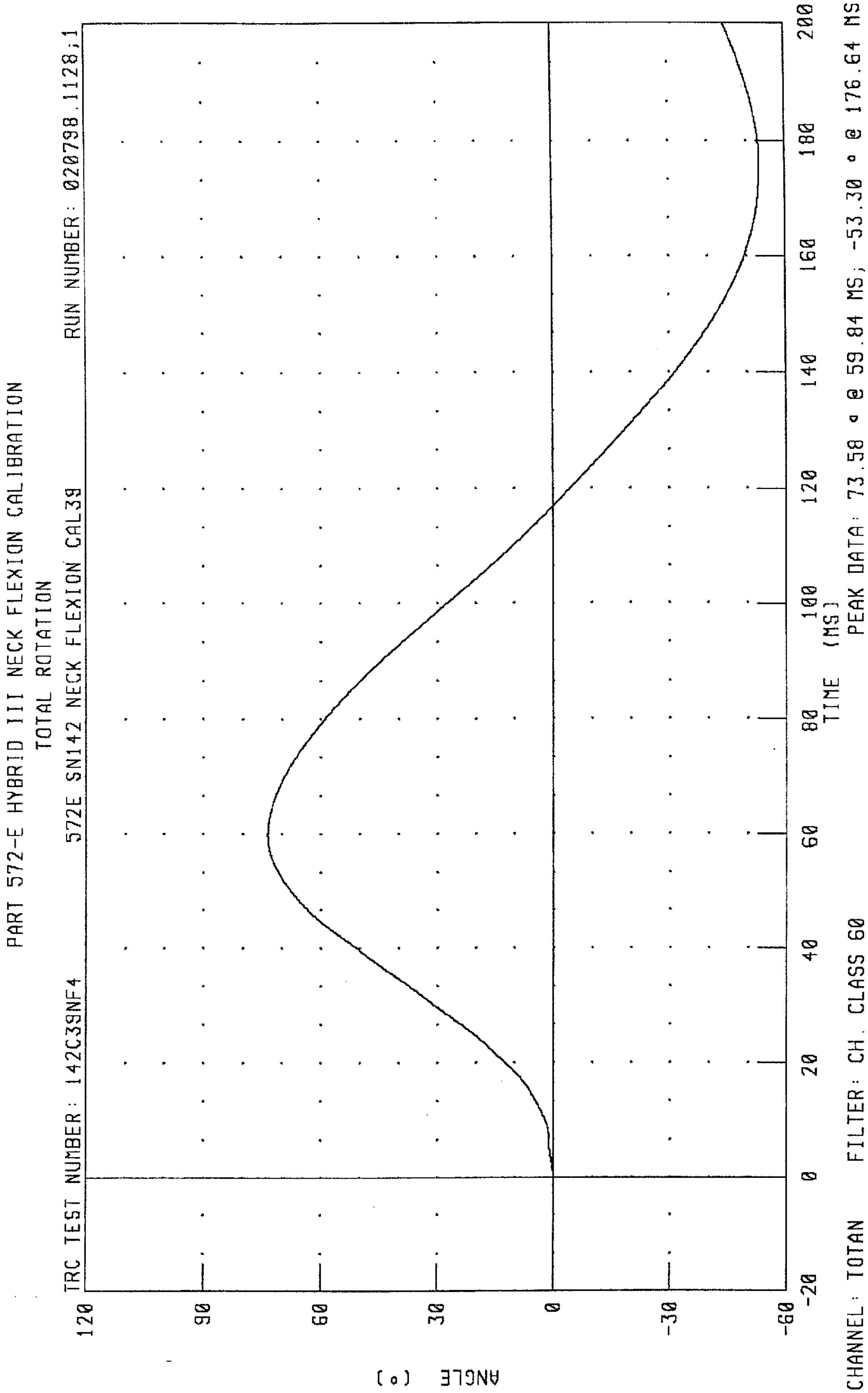
CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 35.87 ° @ 61.04 MS; -23.72 ° @ 173.04 MS

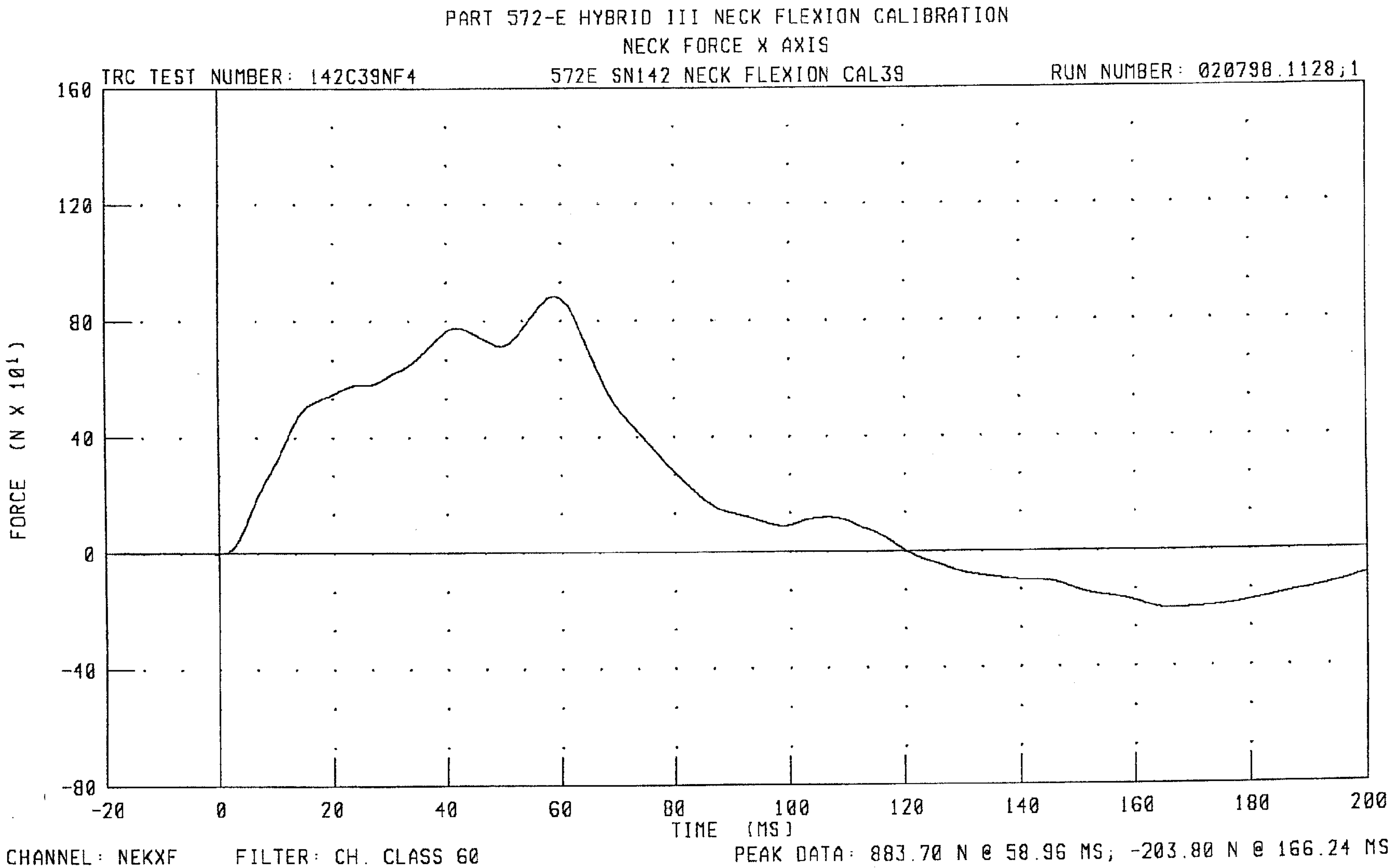
PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 142C39NF4 572E SN142 NECK FLEXION CAL39 RUN NUMBER: 020798.1128;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 37.80 ° @ 58.80 MS; -29.65 ° @ 178.00 MS

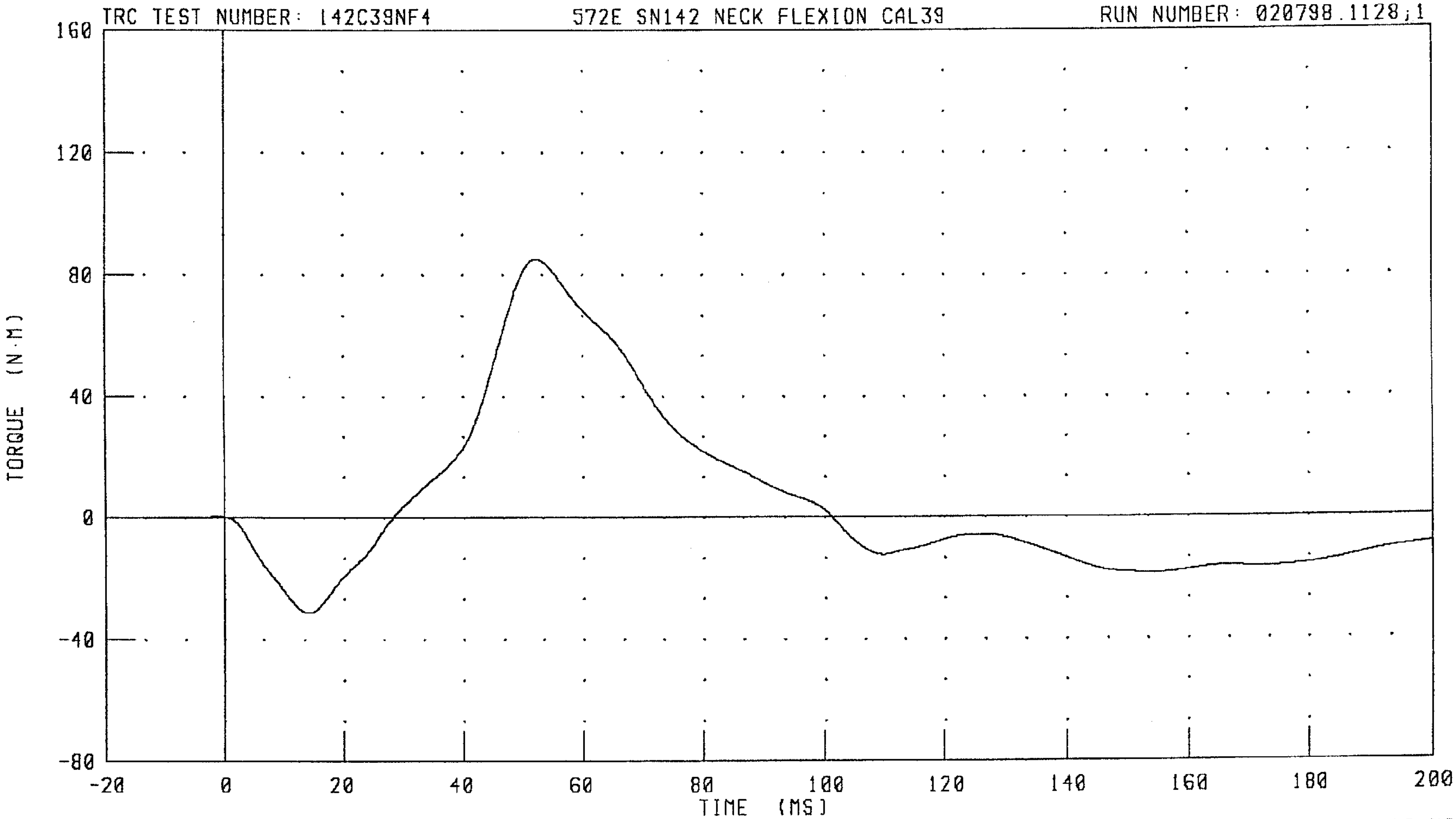

PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 142C39NF4
572E SN142 NECK FLEXION CAL39
RUN NUMBER: 020798.1128;1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 73.58 ° @ 59.84 MS; -53.30 ° @ 176.64 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 142C39NF4
572E SN142 NECK FLEXION CAL39
RUN NUMBER: 020798.1128;1
FORCE (N X 10¹)
160
120
80
40
0
-40
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXF
FILTER: CH. CLASS 60
PEAK DATA: 883.70 N @ 58.96 MS; -203.80 N @ 166.24 MS

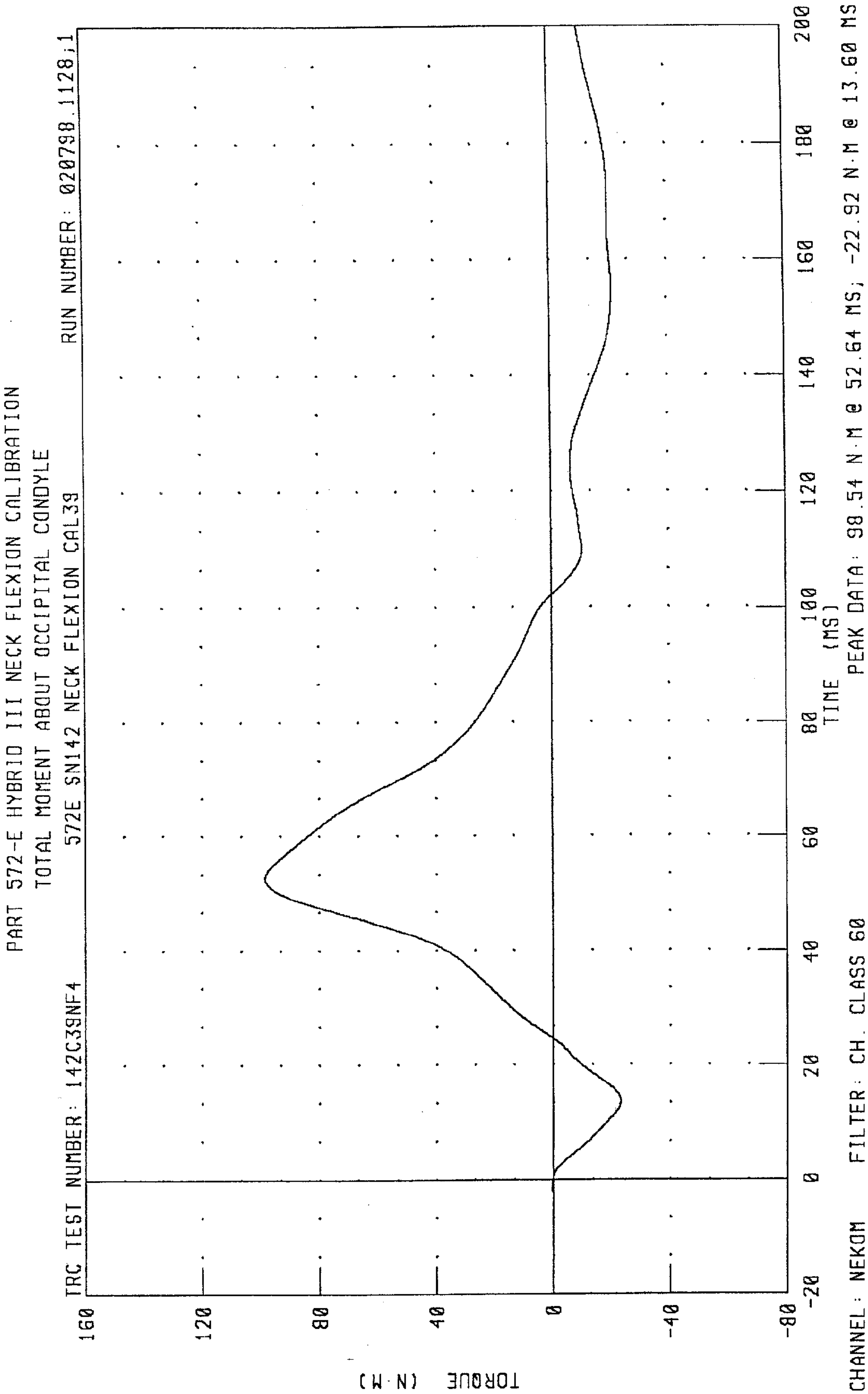
980221

PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

TRC TEST NUMBER: 142C39NF4 572E SN142 NECK FLEXION CAL39 RUN NUMBER: 020798.1128;1



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 85.20 N·M @ 52.32 MS; -31.22 N·M @ 14.16 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
572E SN142 NECK FLEXION CAL39
TRC TEST NUMBER: 142C39NF4
RUN NUMBER: 020798.1128;1
TORQUE (N·M)
160
120
80
40
0
-40
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
PEAK DATA: 98.54 N·M @ 52.64 MS; -22.92 N·M @ 13.60 MS
CHANNEL: NEKOM
FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

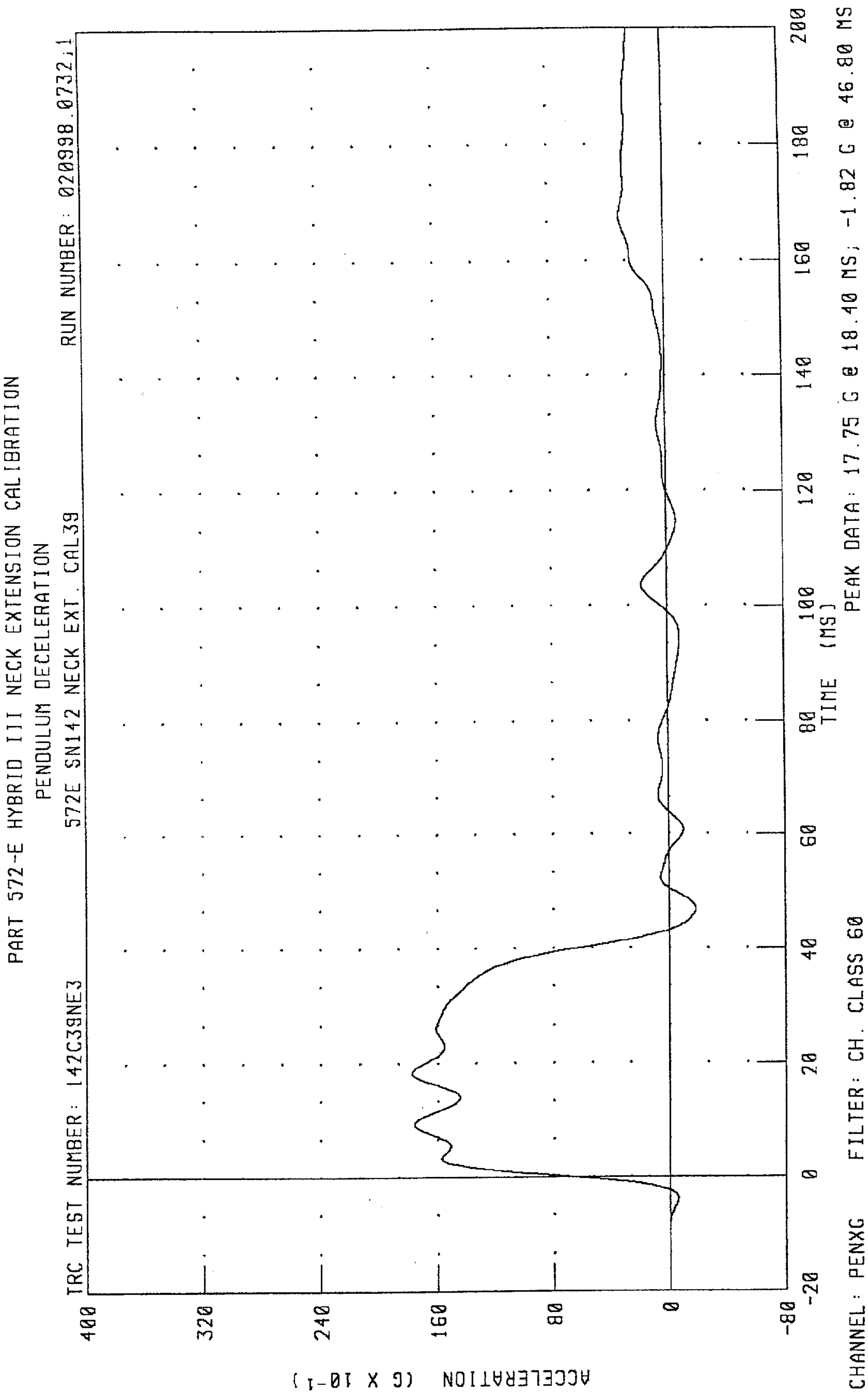
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 142C39NE3 572E SN142 NECK EXT. CAL39

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	37.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.00 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.40 G
	20 MS	14.00 - 19.00 G	16.96 G
	30 MS	11.00 - 16.00 G	15.43 G
MAX PENDULUM G		22 G MAX	17.75 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	15.41 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	40.56 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	93.11 DEG.
	TIME	72 - 82 MS	75.60 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-68.48 NM
	TIME	65 - 79 MS	70.48 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	153.60 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.80 MS

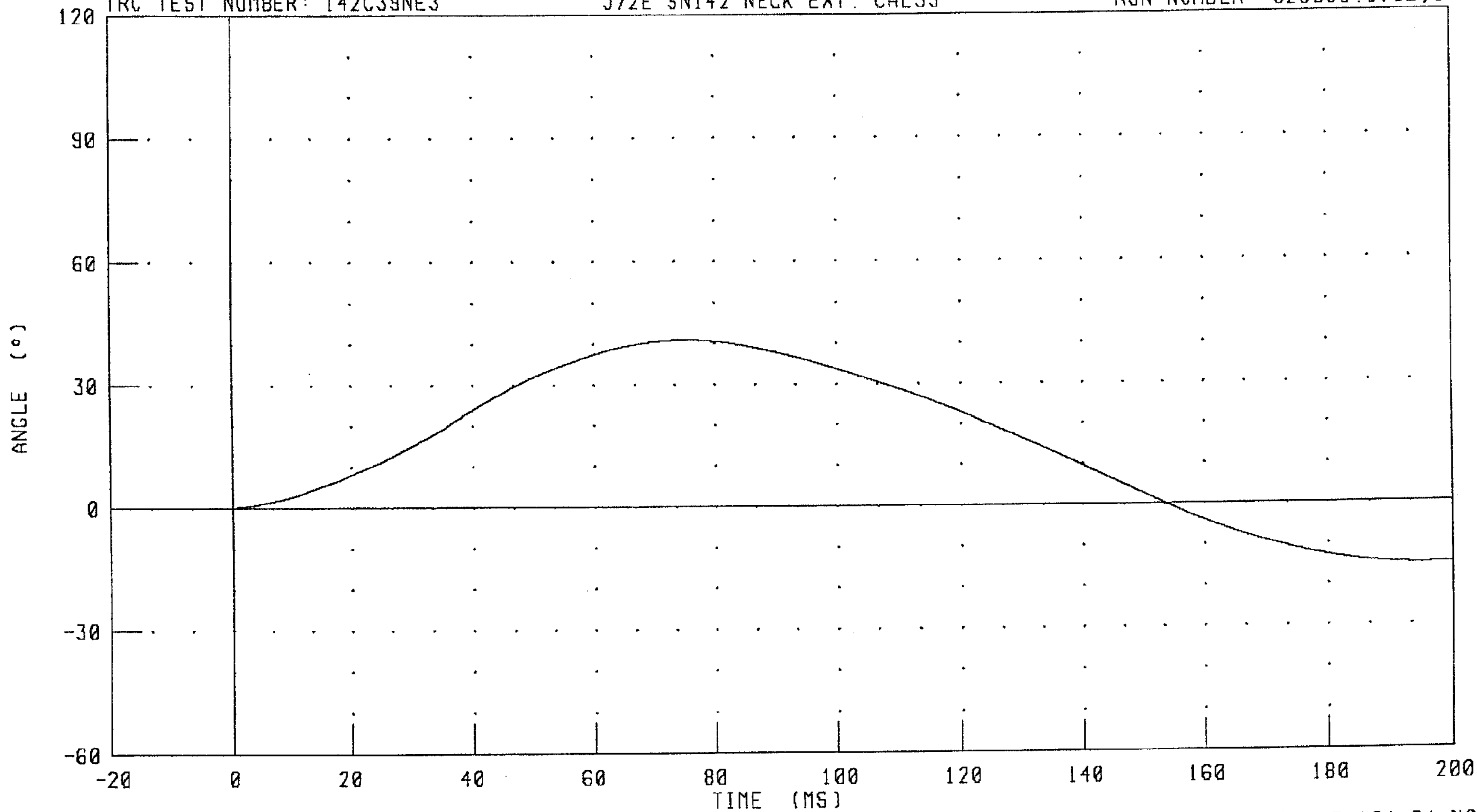
TEST MEETS SPECIFICATIONS

TECHNICIAN [signature] RUN NUMBER: 020998.0731;1


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
572E SN142 NECK EXT. CAL39
TRC TEST NUMBER: 142C39NE3
RUN NUMBER: 020998.0732;1
ACCELERATION (G X 10-1)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 60
PEAK DATA: 17.75 G @ 18.40 MS; -1.82 G @ 46.80 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK

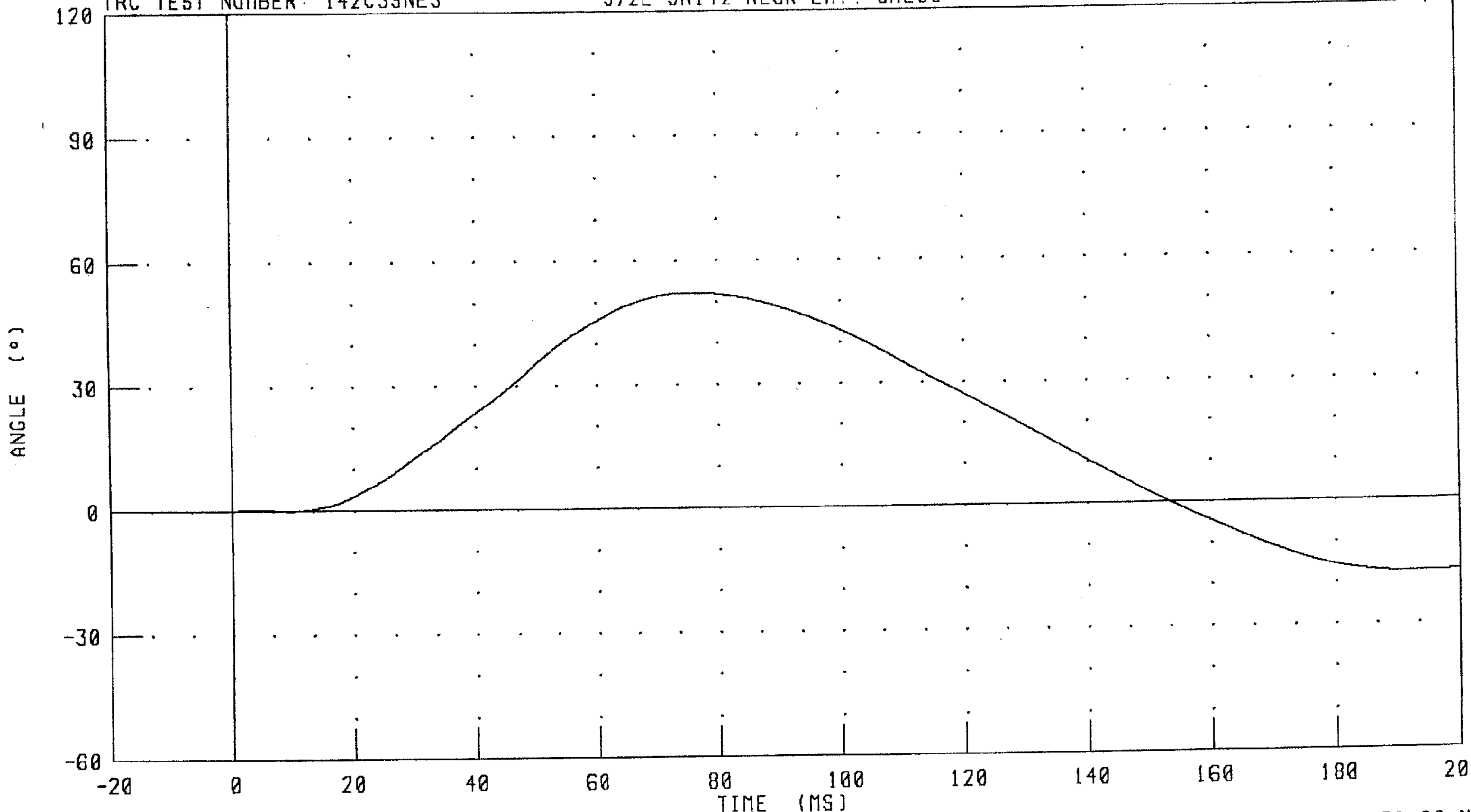
TRC TEST NUMBER: 142C39NE3 572E SN142 NECK EXT. CAL39 RUN NUMBER: 020998.0732;1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 40.90 ° @ 75.12 MS; -15.11 ° @ 194.64 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

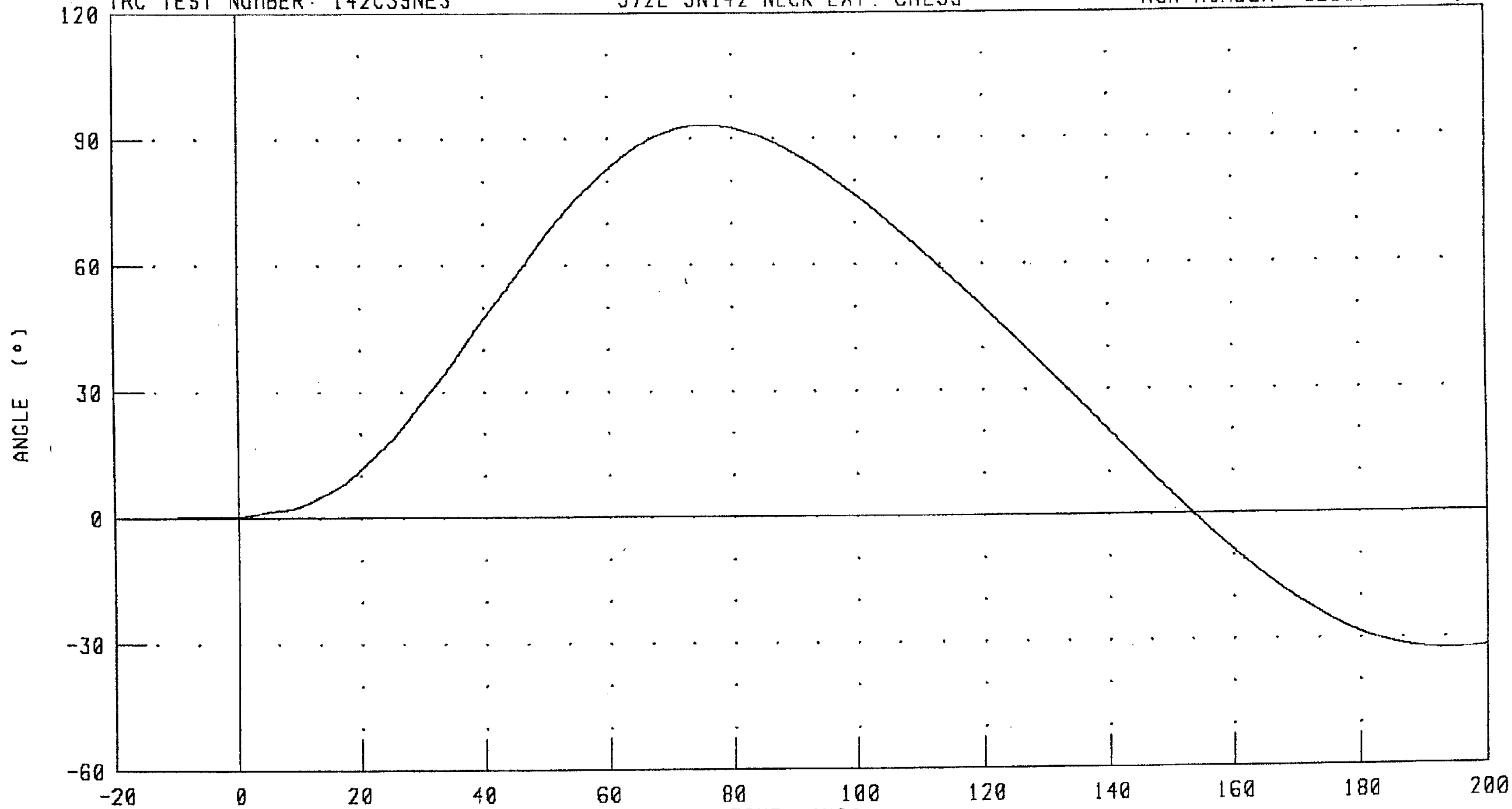
TRC TEST NUMBER: 142C39NE3 572E SN142 NECK EXT. CAL39 RUN NUMBER: 020998.0732;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 52.22 ° @ 76.16 MS; -17.57 ° @ 192.88 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL ROTATION

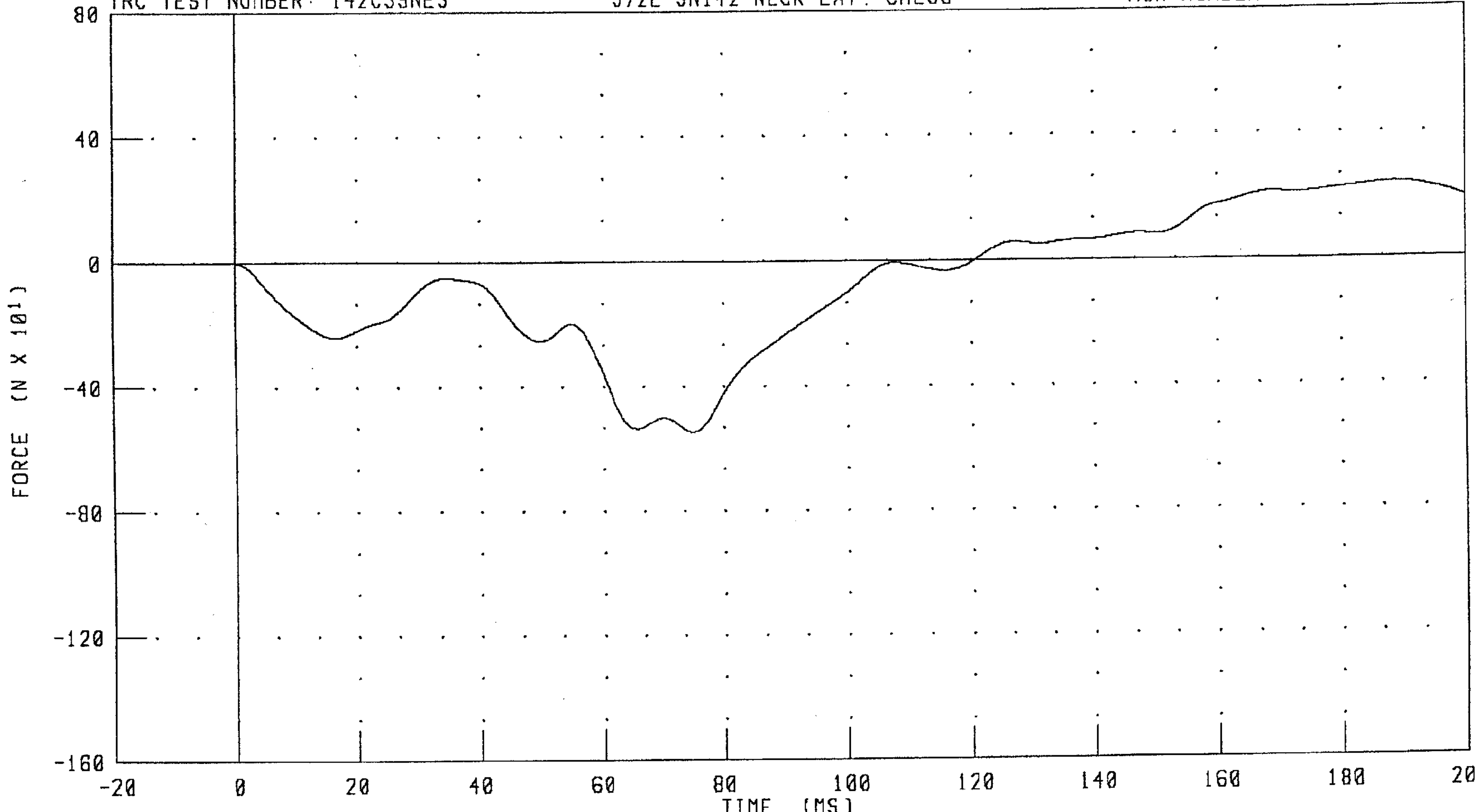
TRC TEST NUMBER: 142C39NE3 572E SN142 NECK EXT. CAL39 RUN NUMBER: 020998.0732;1



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 93.11 ° @ 75.60 MS; -32.66 ° @ 194.00 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS

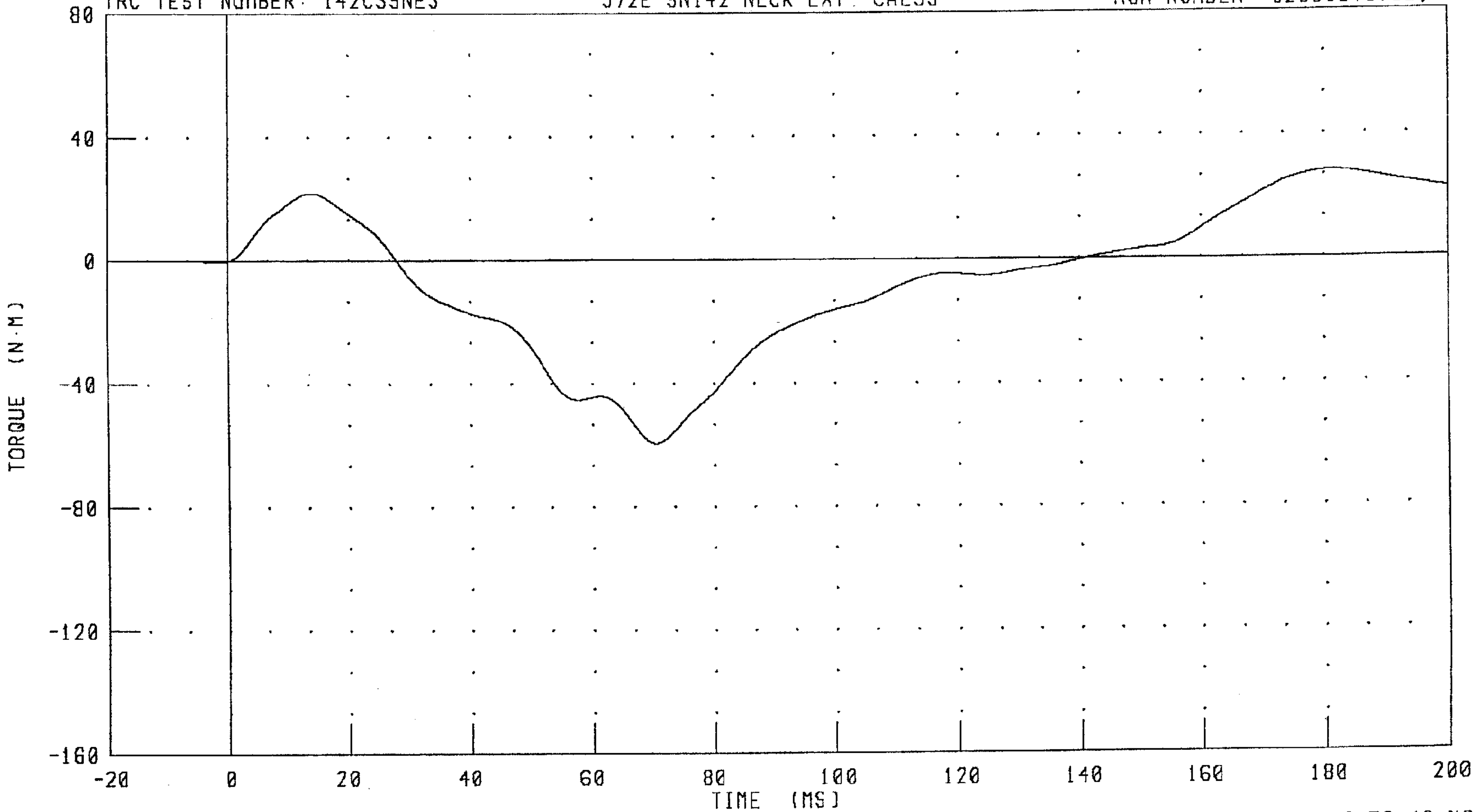
TRC TEST NUMBER: 142C39NE3 572E SN142 NECK EXT. CAL39 RUN NUMBER: 020998.0732;1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 238.67 N @ 188.72 MS; -547.83 N @ 74.88 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS

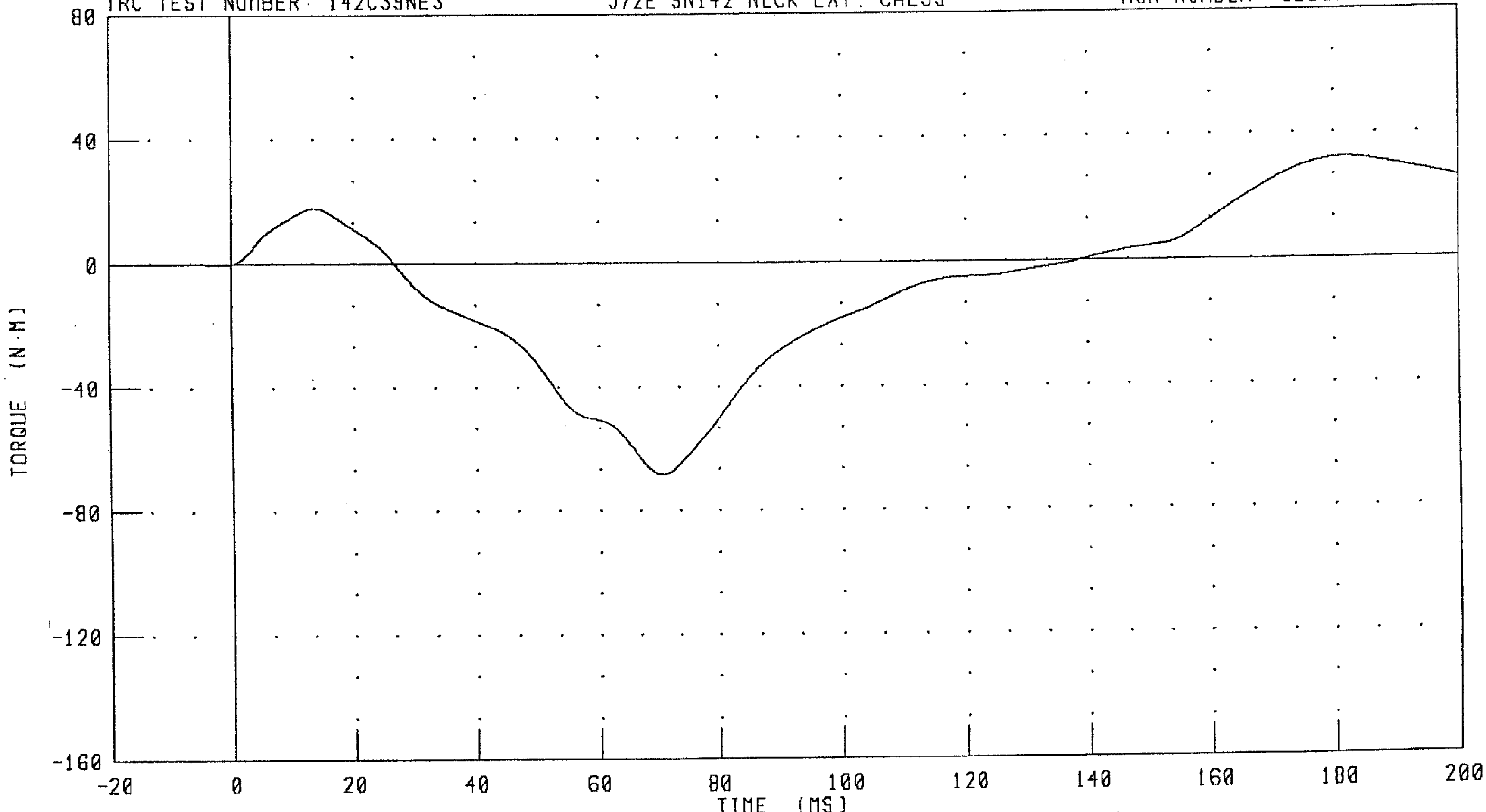
TRC TEST NUMBER: 142C39NE3 572E SN142 NECK EXT. CAL39 RUN NUMBER: 020998.0732;1



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 28.03 N·M @ 181.60 MS; -59.54 N·M @ 70.40 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 142C39NE3 572E SN142 NECK EXT. CAL39 RUN NUMBER: 020998.0732;1



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 32.06 N·M @ 181.92 MS; -68.48 N·M @ 70.48 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

TRC INC. TEST NO: 142C39TH1 572E SN142 H.S.THORAX CAL39

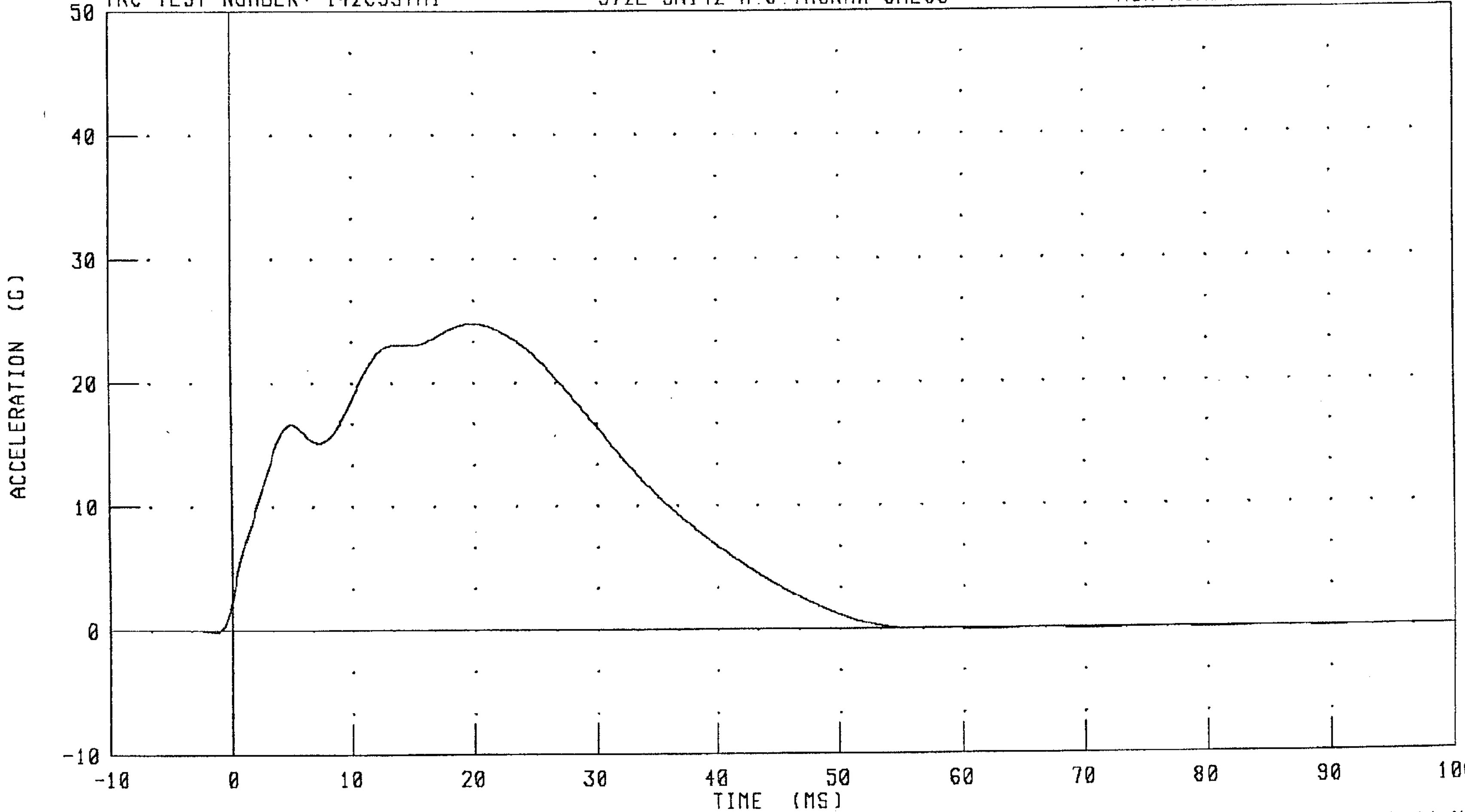
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.71 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	72.5 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5670. N
INTERNAL HYSTERESIS	69% - 85%	70.9%

TEST MEETS SPECIFICATIONS

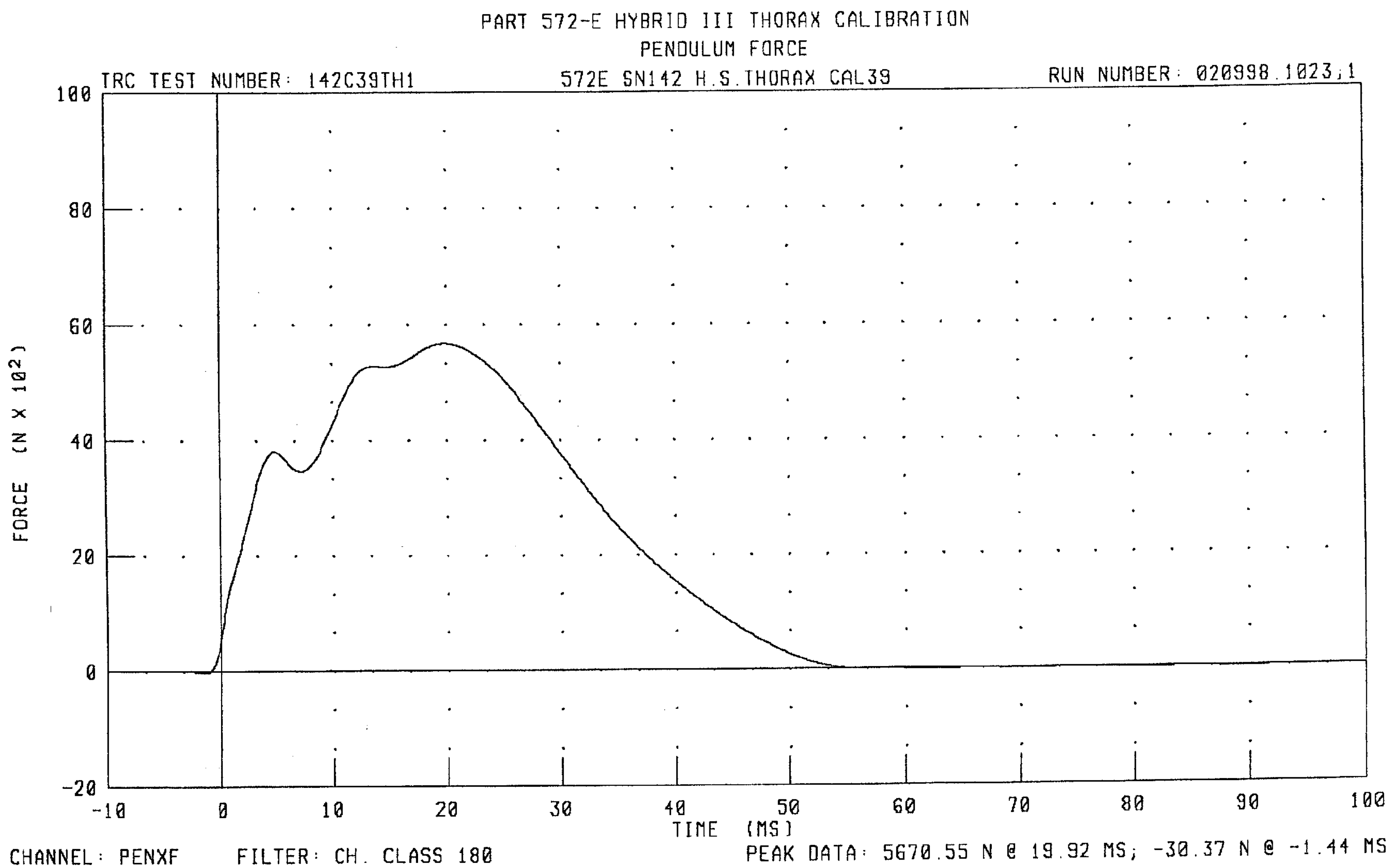
TECHNICIAN B. Cal A RUN NUMBER: 020998.1022;1

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 142C39TH1 572E SN142 H.S.THORAX CAL39 RUN NUMBER: 020998.1023;1

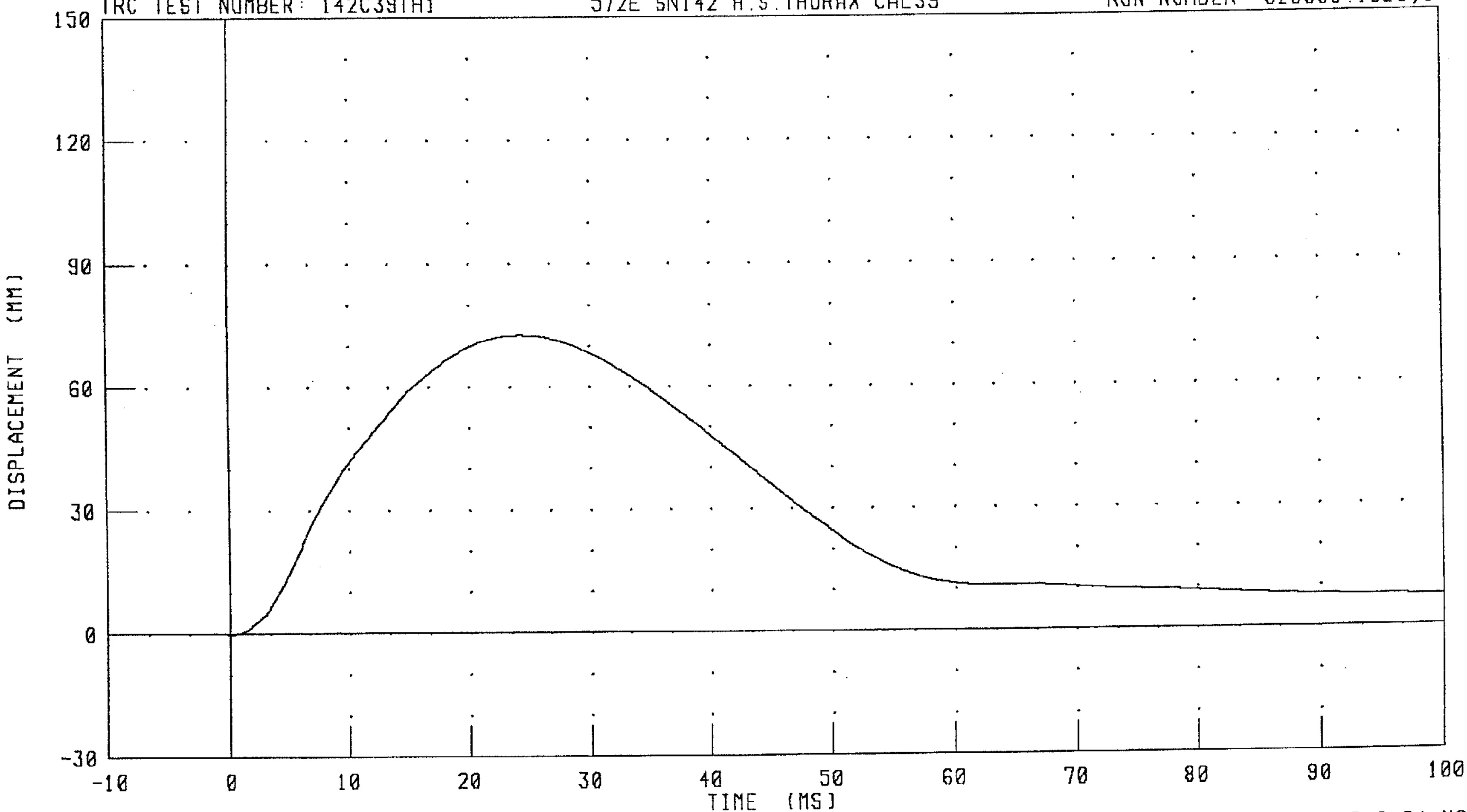


CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 24.75 G @ 19.92 MS; -0.13 G @ -1.44 MS


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE
TRC TEST NUMBER: 142C39TH1
572E SN142 H.S.THORAX CAL39
RUN NUMBER: 020998.1023;1
FORCE (N X 10²)
TIME (MS)
CHANNEL: PENXF
FILTER: CH. CLASS 180
PEAK DATA: 5670.55 N @ 19.92 MS; -30.37 N @ -1.44 MS

PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

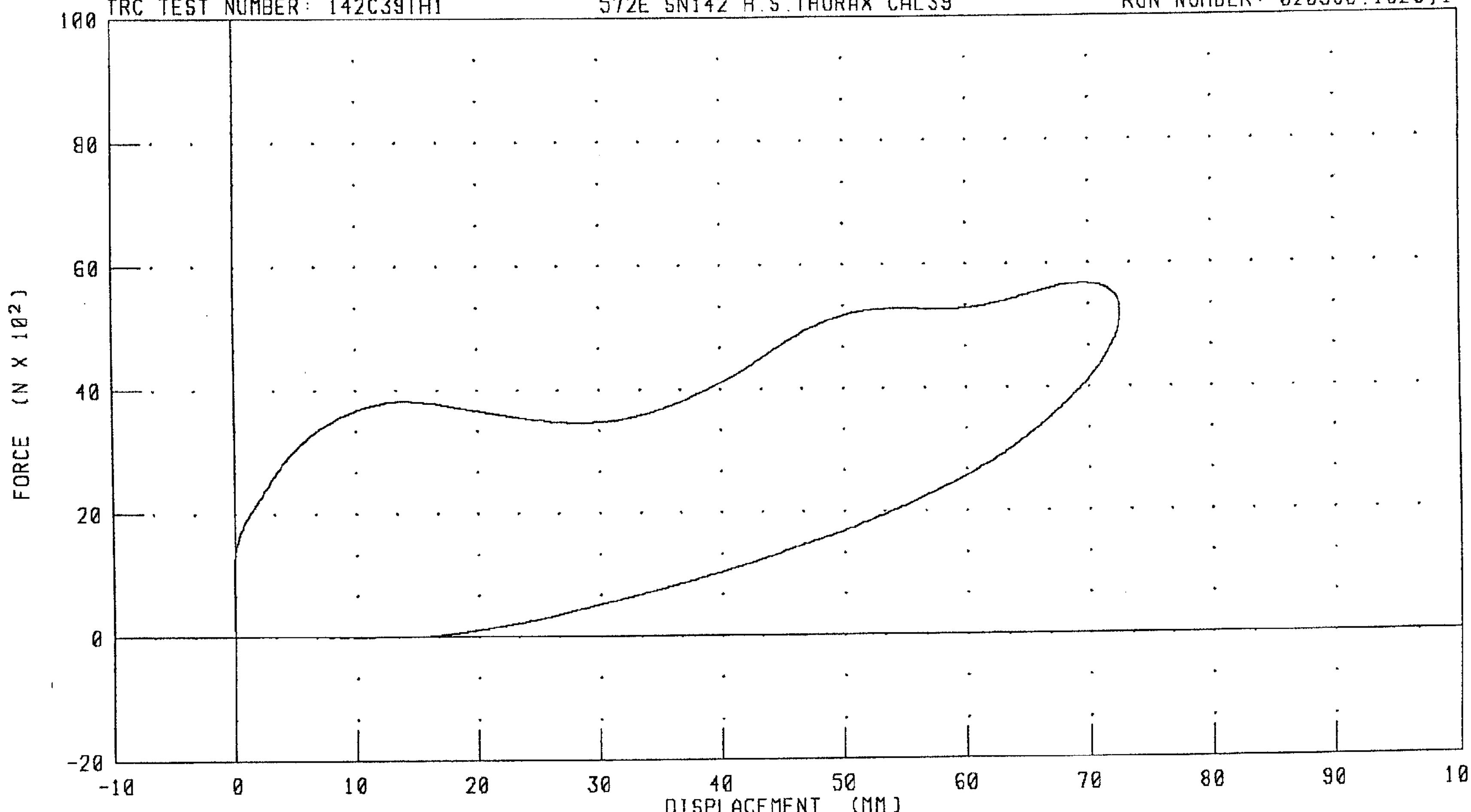
TRC TEST NUMBER: 142C39TH1 572E SN142 H.S.THORAX CAL39 RUN NUMBER: 020998.1023;1



CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 72.59 MM @ 24.24 MS; -0.09 MM @ 0.24 MS

PART 572-E HYBRID III THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 142C39TH1   572E SN142 H.S.THORAX CAL39   RUN NUMBER: 020998.1023;1



CHANNEL: CSTXD   FILTER: CH. CLASS 180
PENXF   CH. CLASS 180

PEAK DATA: 72.59 MM @ 24.24 MS; -0.09 MM @ 0.24 MS
5670.55 N @ 19.92 MS; -30.37 N @ -1.44 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E 07-FEB-98

TRC INC. TEST NO: 142C39HR1 RIGHT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	72.9 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	44.2 deg.

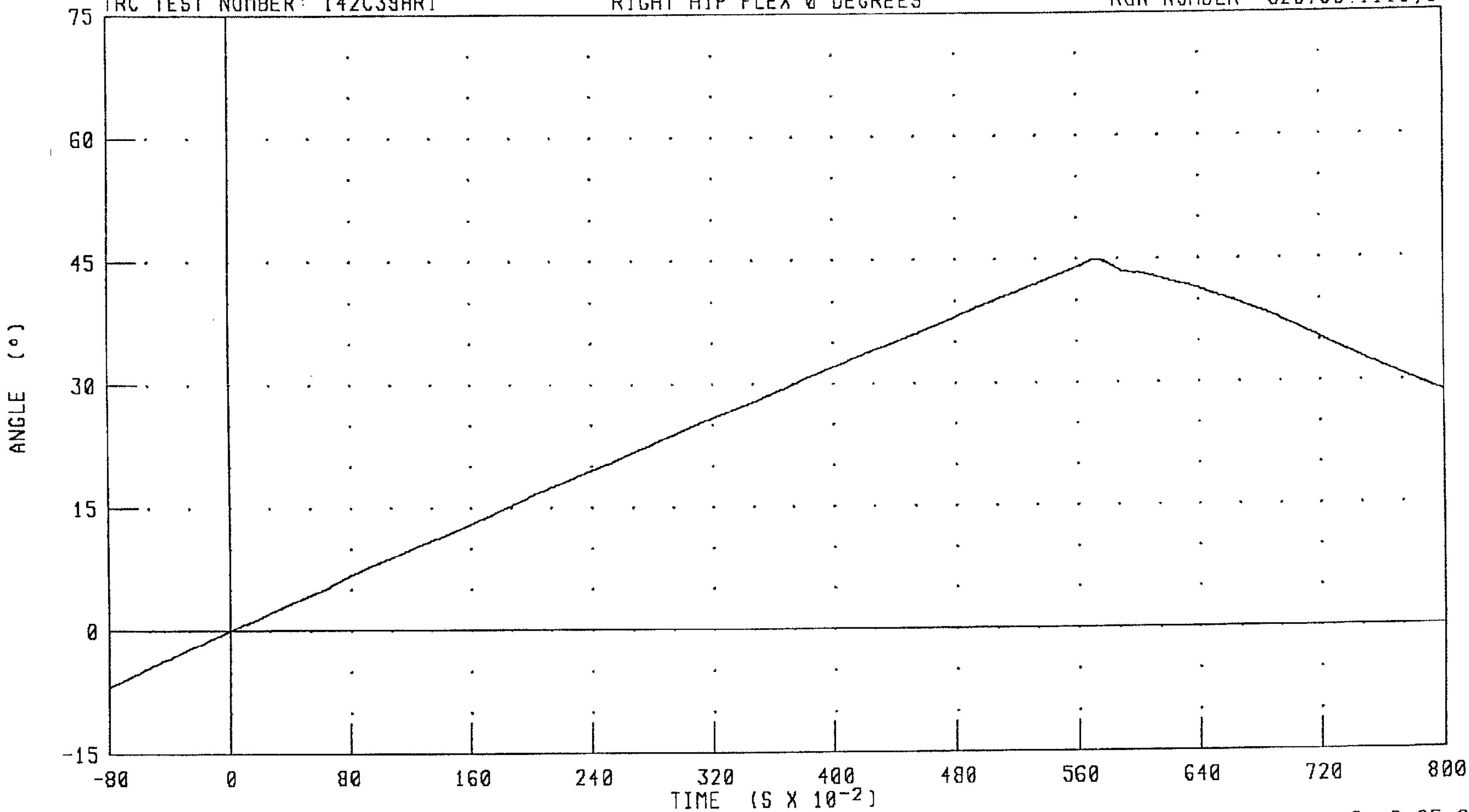
TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claudge RUN NUMBER: 020798.1107;1

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION ROTATION
RIGHT HIP FLEX 0 DEGREES

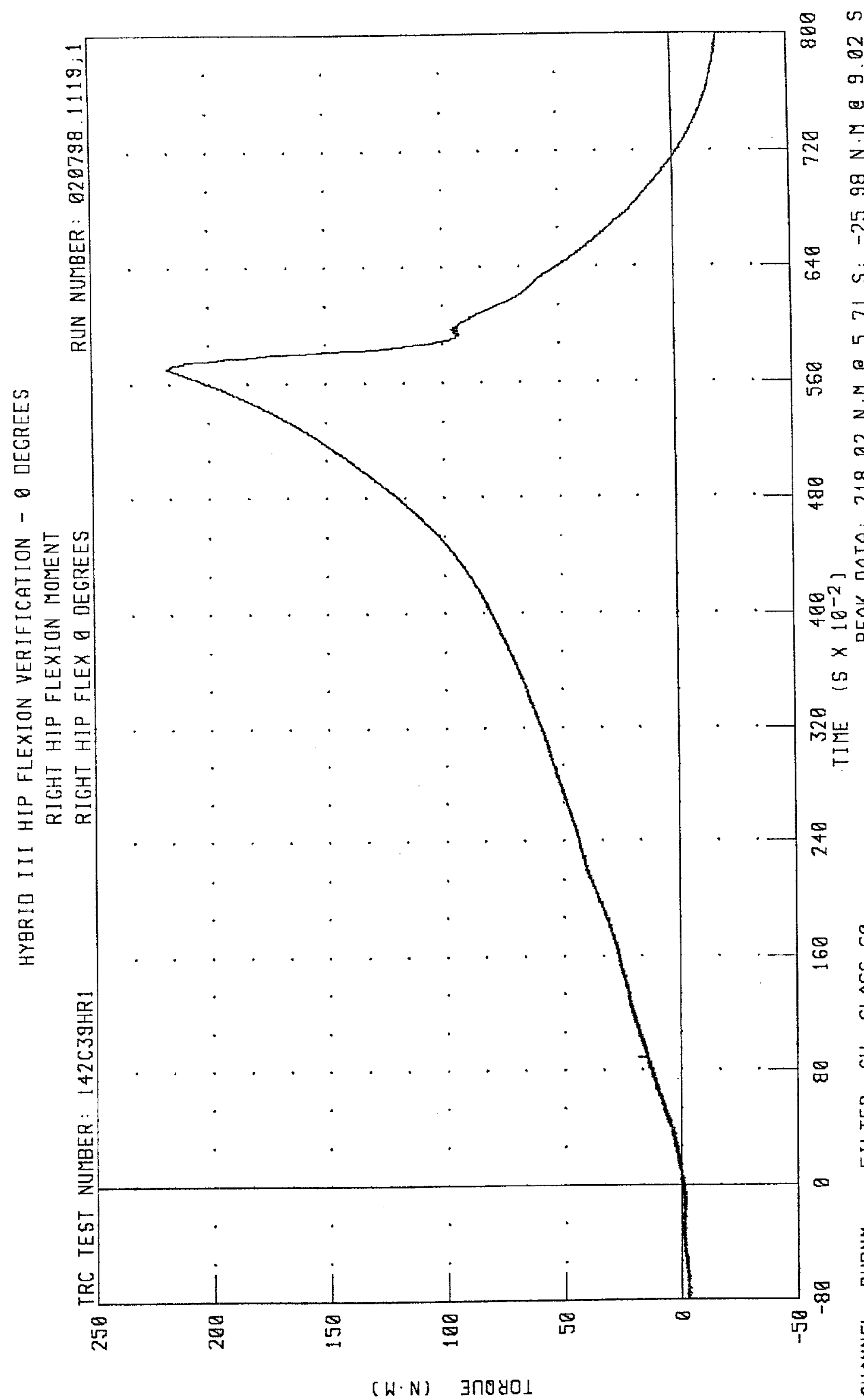
TRC TEST NUMBER: 142C39HR1

RUN NUMBER: 020798.1119;1



CHANNEL: RHPXD   FILTER: CH. CLASS 60

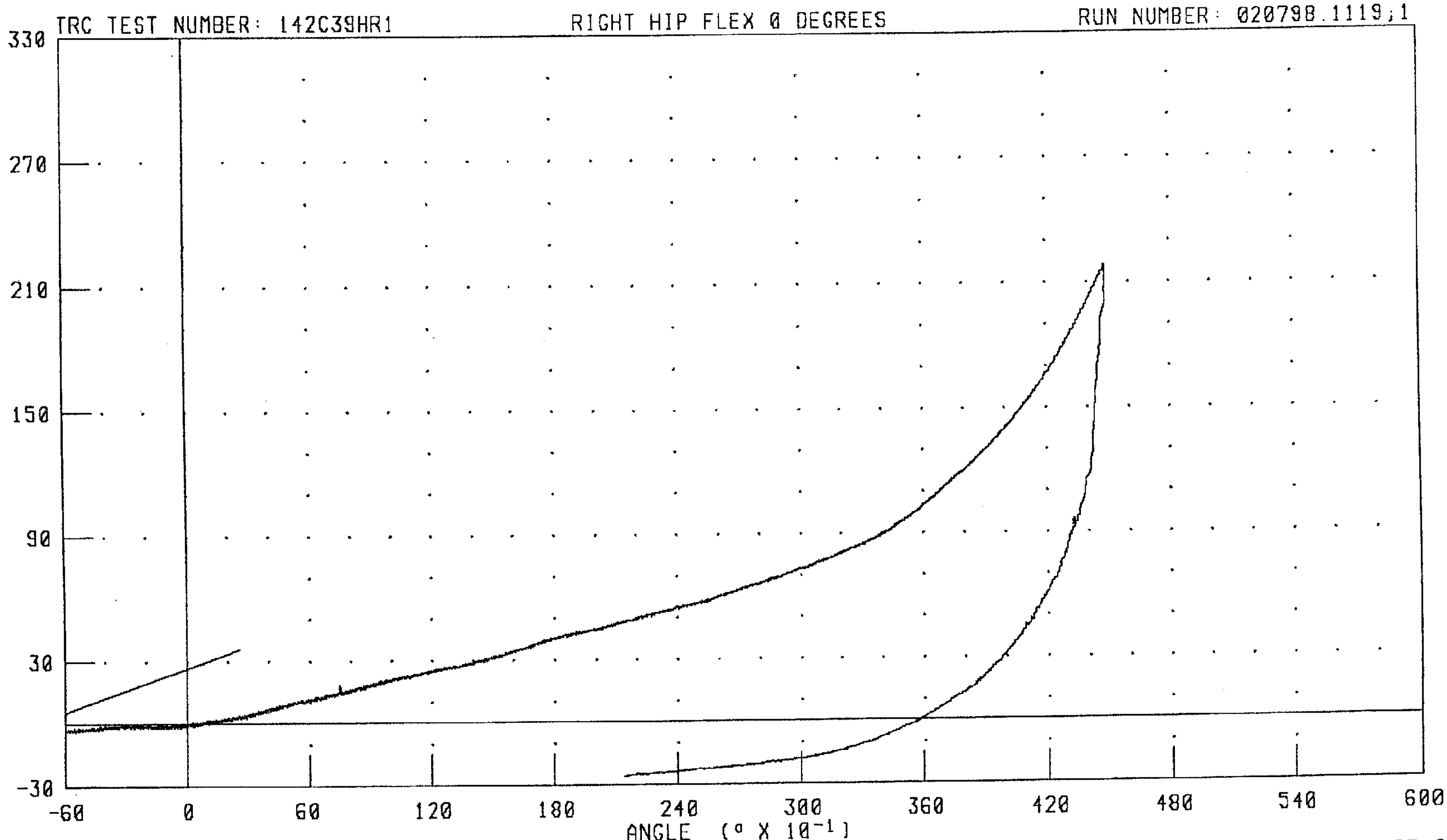
PEAK DATA: 44.85 ° @ 5.76 S; -9.68 ° @ -0.95 S


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION MOMENT
RIGHT HIP FLEX 0 DEGREES
TRC TEST NUMBER: 142C39HR1
RUN NUMBER: 020798.1119;1
TORQUE (N·M)
250
200
150
100
50
0
-50
-80
0
80
160
240
320
400
480
560
640
720
800
TIME (S X 10^-2)
CHANNEL: RHPYM
FILTER: CH. CLASS 60
PEAK DATA: 218.02 N·M @ 5.71 S; -25.98 N·M @ 9.02 S

980221

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION MOMENT VS ROTATION ANGLE



CHANNEL: RHPXD FILTER: CH. CLASS 60
RHPYM CH. CLASS 60

PEAK DATA: 44.85 ° @ 5.76 S; -9.68 ° @ -0.95 S
218.02 N·M @ 5.71 S; -25.98 N·M @ 9.02 S

TRANSPORTATION RESEARCH CENTER INC.

LEFT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E 07-FEB-98

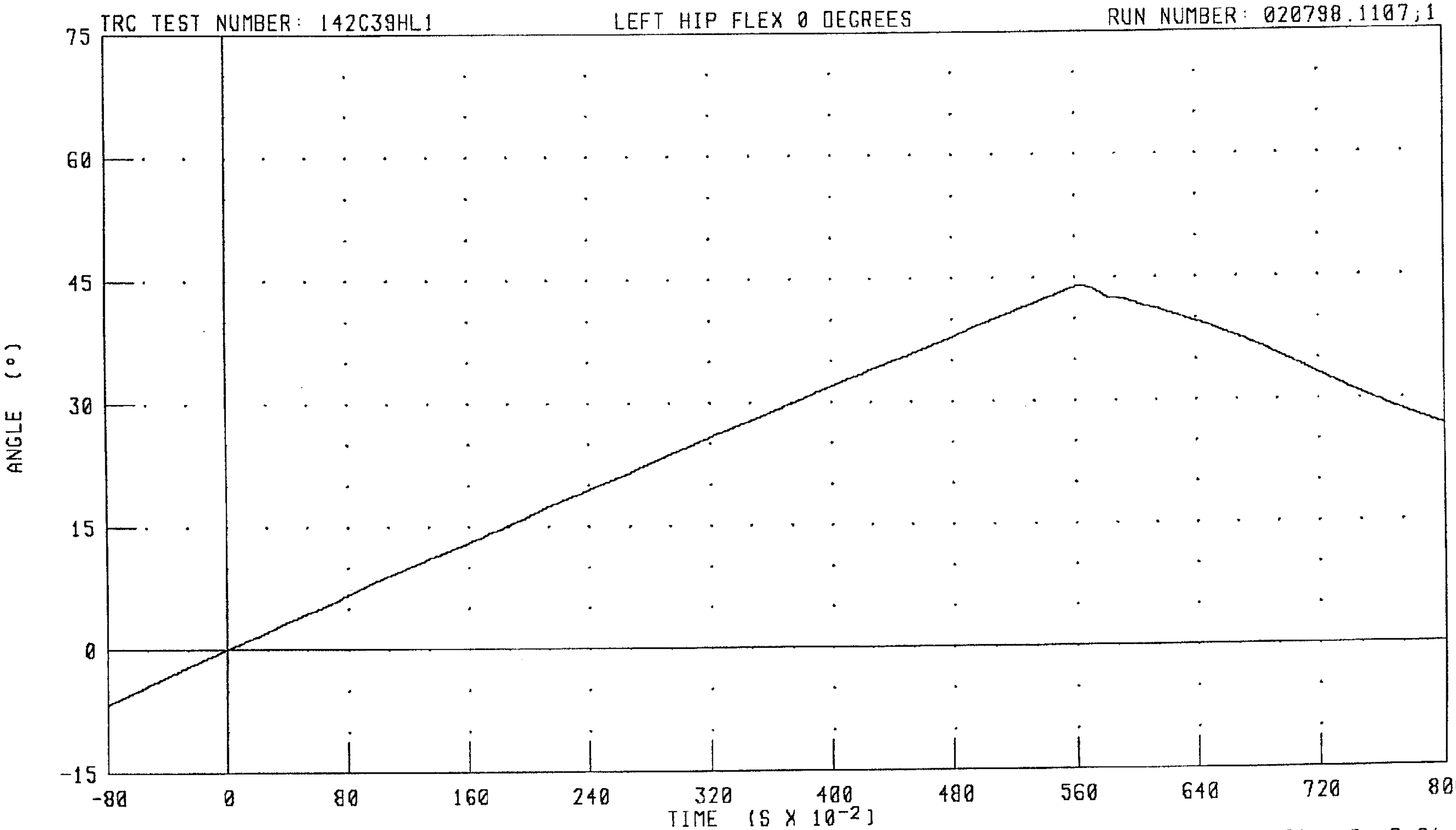
TRC INC. TEST NO: 142C39HL1 LEFT HIP FLEX 0 DEGREES

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	66.5 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	43.3 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claudy RUN NUMBER: 020798.1104;1

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION ROTATION
LEFT HIP FLEX 0 DEGREES

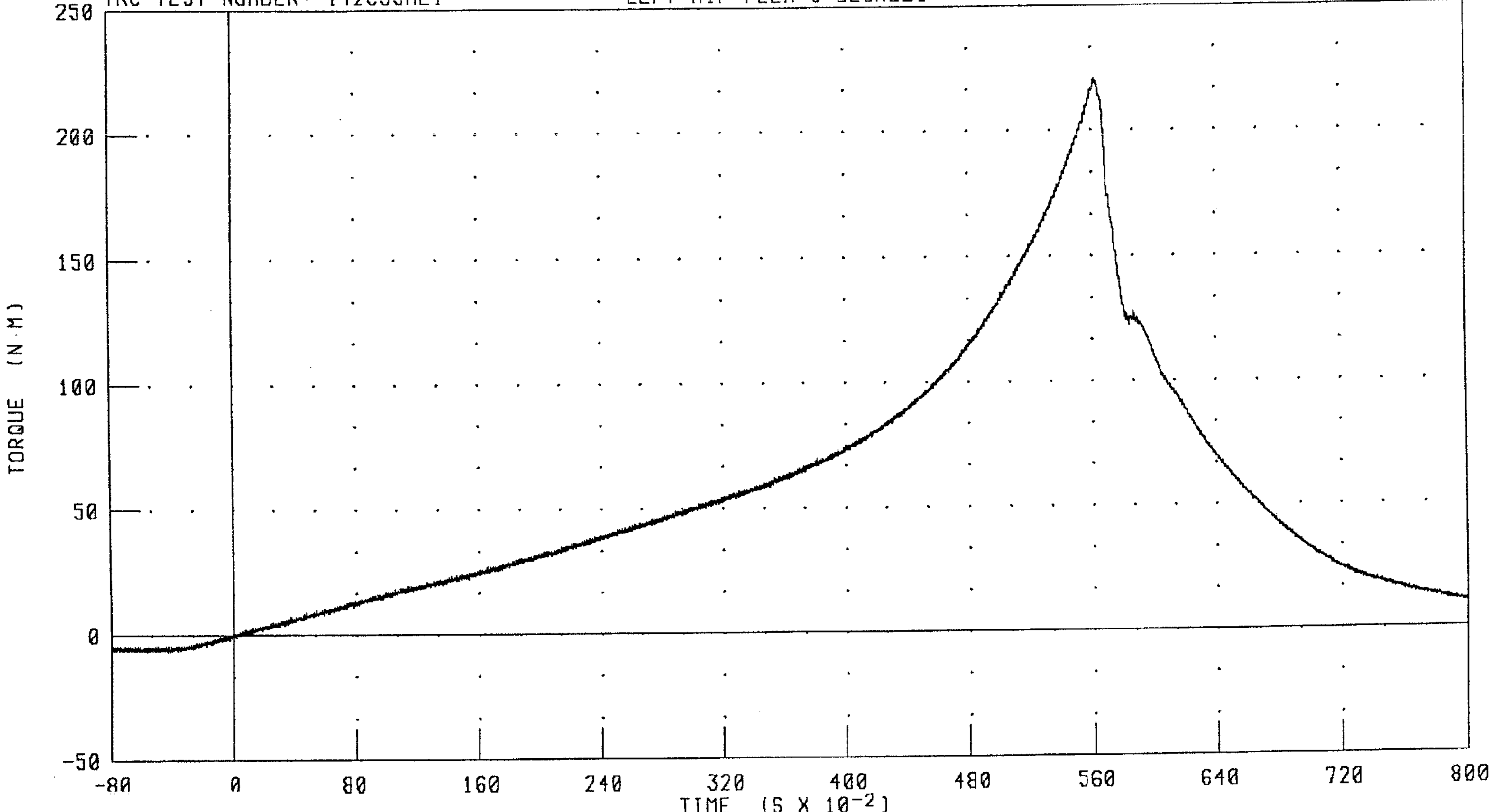


CHANNEL: LHPXD FILTER: CH. CLASS 1000 PEAK DATA: 44.01 ° @ 5.63 S; -7.81 ° @ -0.91 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT
LEFT HIP FLEX 0 DEGREES

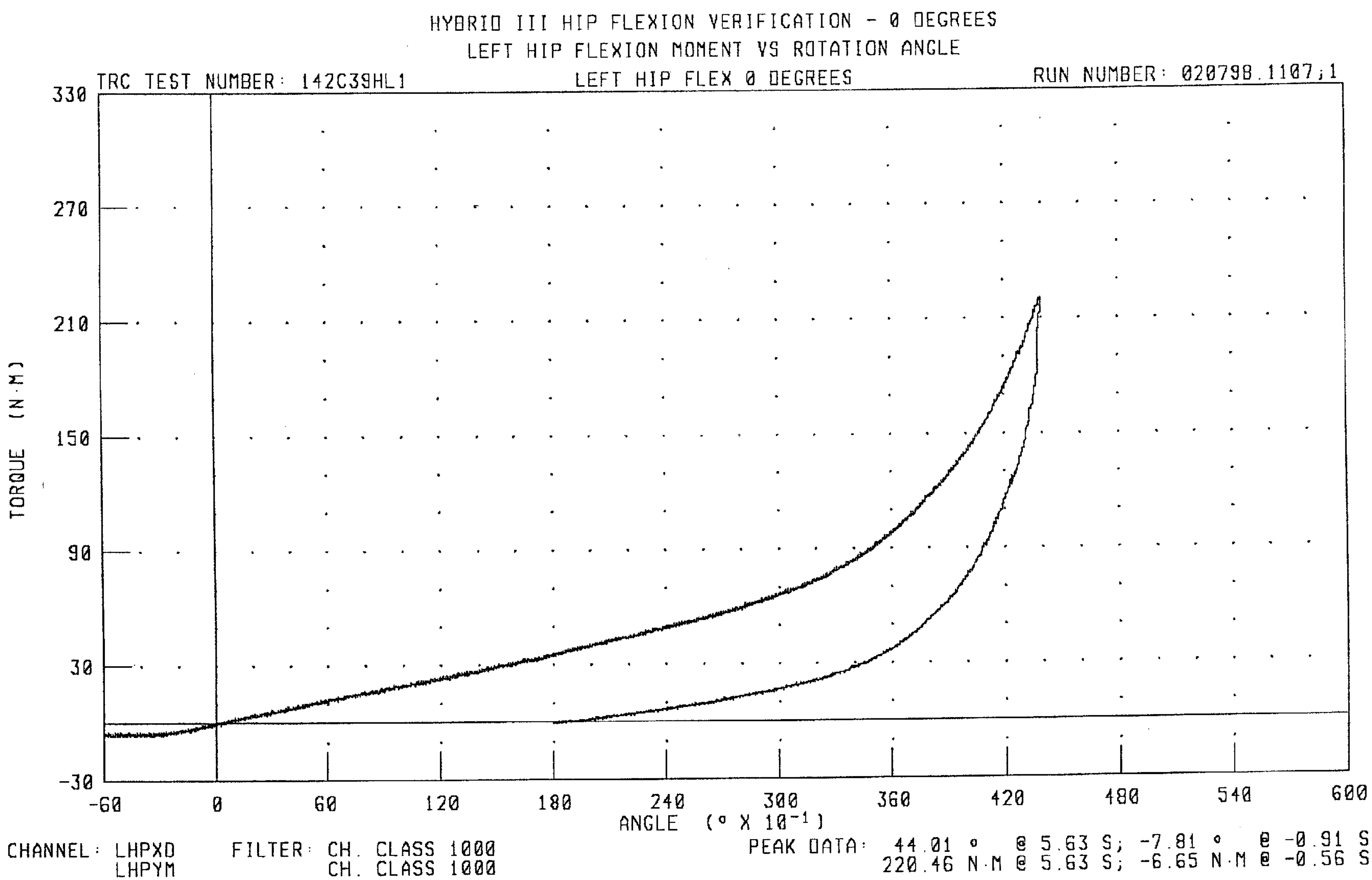
TRC TEST NUMBER: 142C39HL1

RUN NUMBER: 020798.1107;1



CHANNEL: LHPYM   FILTER: CH. CLASS 1000

PEAK DATA: 220.46 N·M @ 5.63 S; -6.65 N·M @ -0.56 S


HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT VS ROTATION ANGLE
TRC TEST NUMBER: 142C39HL1
LEFT HIP FLEX 0 DEGREES
RUN NUMBER: 020798.1107;1
330
270
210
150
90
30
-30
TORQUE (N·M)
-60
0
60
120
180
240
300
360
420
480
540
600
ANGLE (° X 10⁻¹)
CHANNEL: LHPXD
LHPYM
FILTER: CH. CLASS 1000
CH. CLASS 1000
PEAK DATA: 44.01 ° @ 5.63 S; -7.81 ° @ -0.91 S
220.46 N·M @ 5.63 S; -6.65 N·M @ -0.56 S

980221

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

TRC INC. TEST NO: 142C39RK1 572E SN142 RIGHT KNEE CAL 39

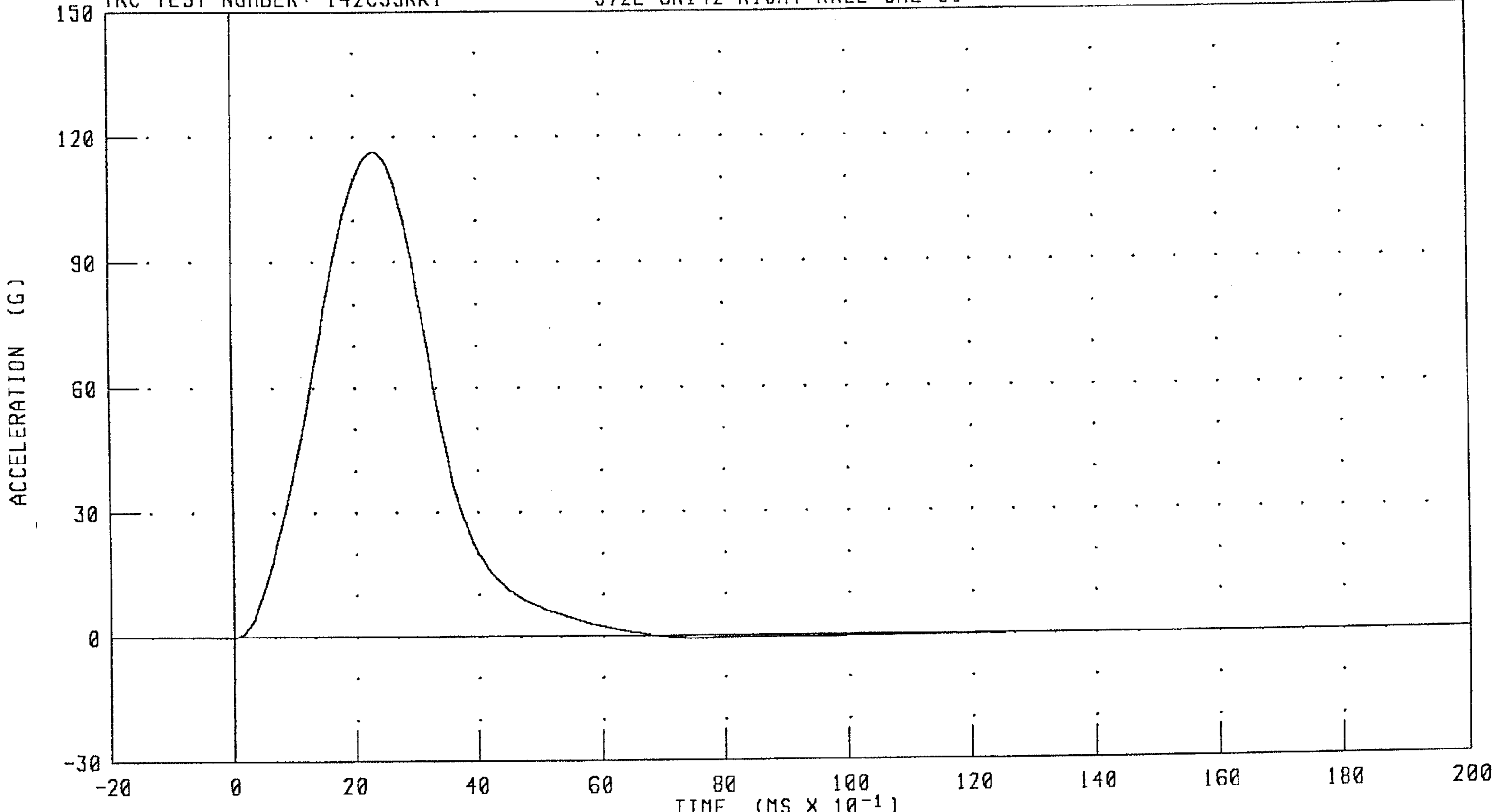
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5695.7 N

TEST MEETS SPECIFICATIONS

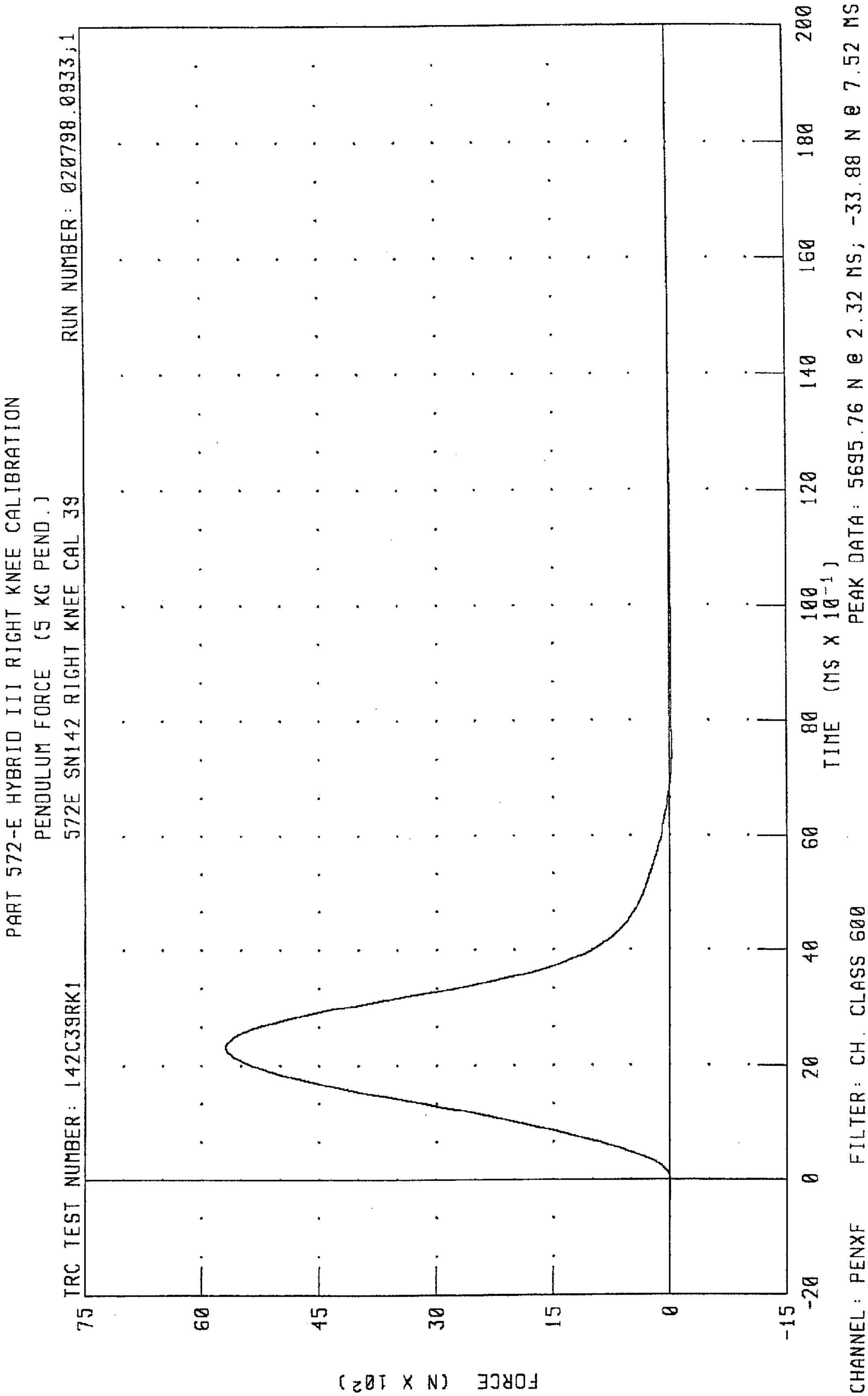
TECHNICIAN John K. Claridge RUN NUMBER: 020798.0933;1

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 142C39RK1 572E SN142 RIGHT KNEE CAL 39 RUN NUMBER: 020798.0933;1



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 116.41 G @ 2.32 MS; -0.69 G @ 7.52 MS


PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)
572E SN142 RIGHT KNEE CAL 39
TRC TEST NUMBER: 142C39RK1
RUN NUMBER: 020798.0933;1
FORCE (N X 10^2)
75
60
45
30
15
0
-15
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10^{-1})
CHANNEL: PENXF
FILTER: CH. CLASS 600
PEAK DATA: 5695.76 N @ 2.32 MS; -33.88 N @ 7.52 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

TRC INC. TEST NO: 142C39LK1 572E SN142 LEFT KNEE CAL 39

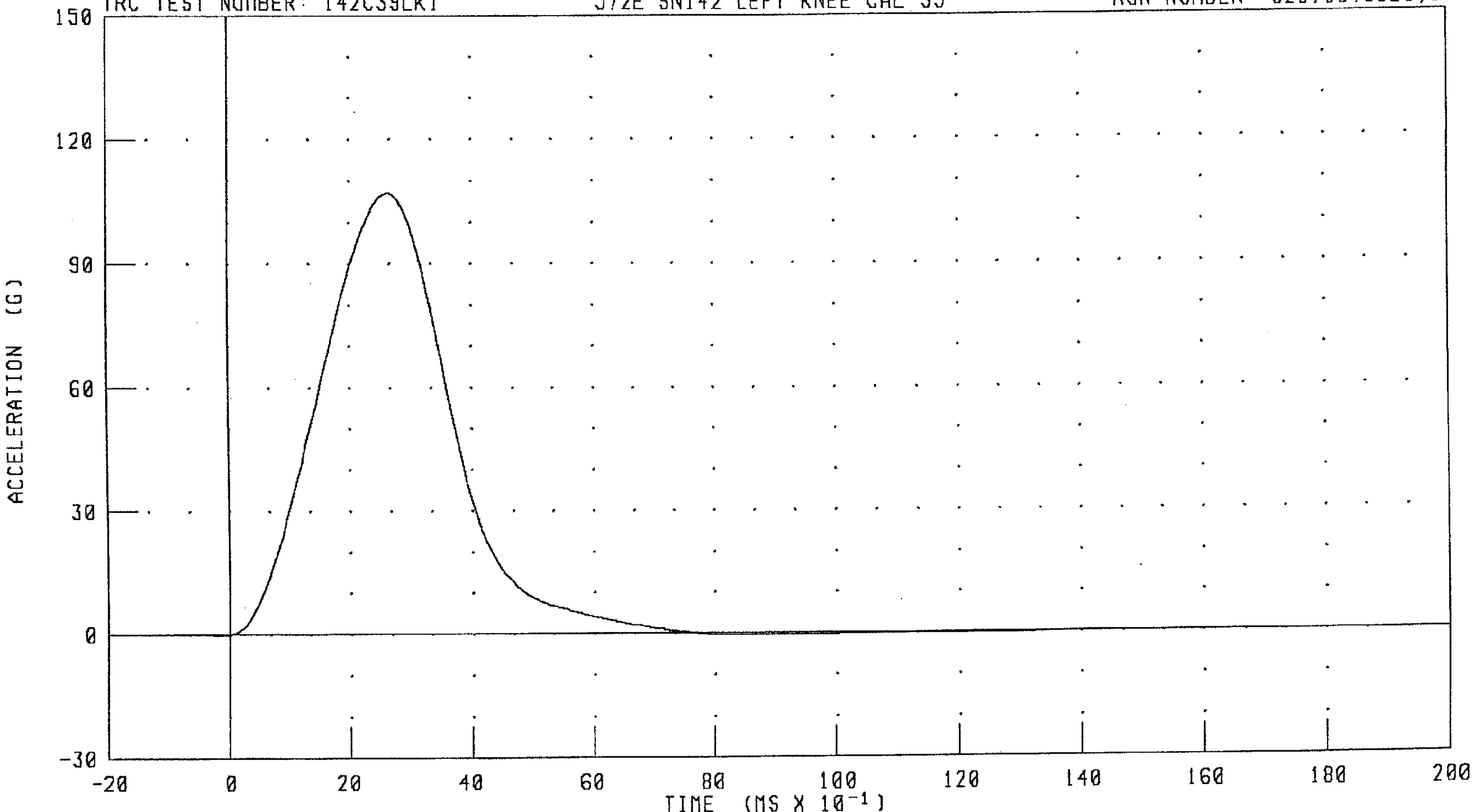
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	37.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5239.8 N

TEST MEETS SPECIFICATIONS

TECHNICIAN John K. Claridge RUN NUMBER: 020798.0927;1

PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 142C39LK1 572E SN142 LEFT KNEE CAL 39 RUN NUMBER: 020798.0929;1

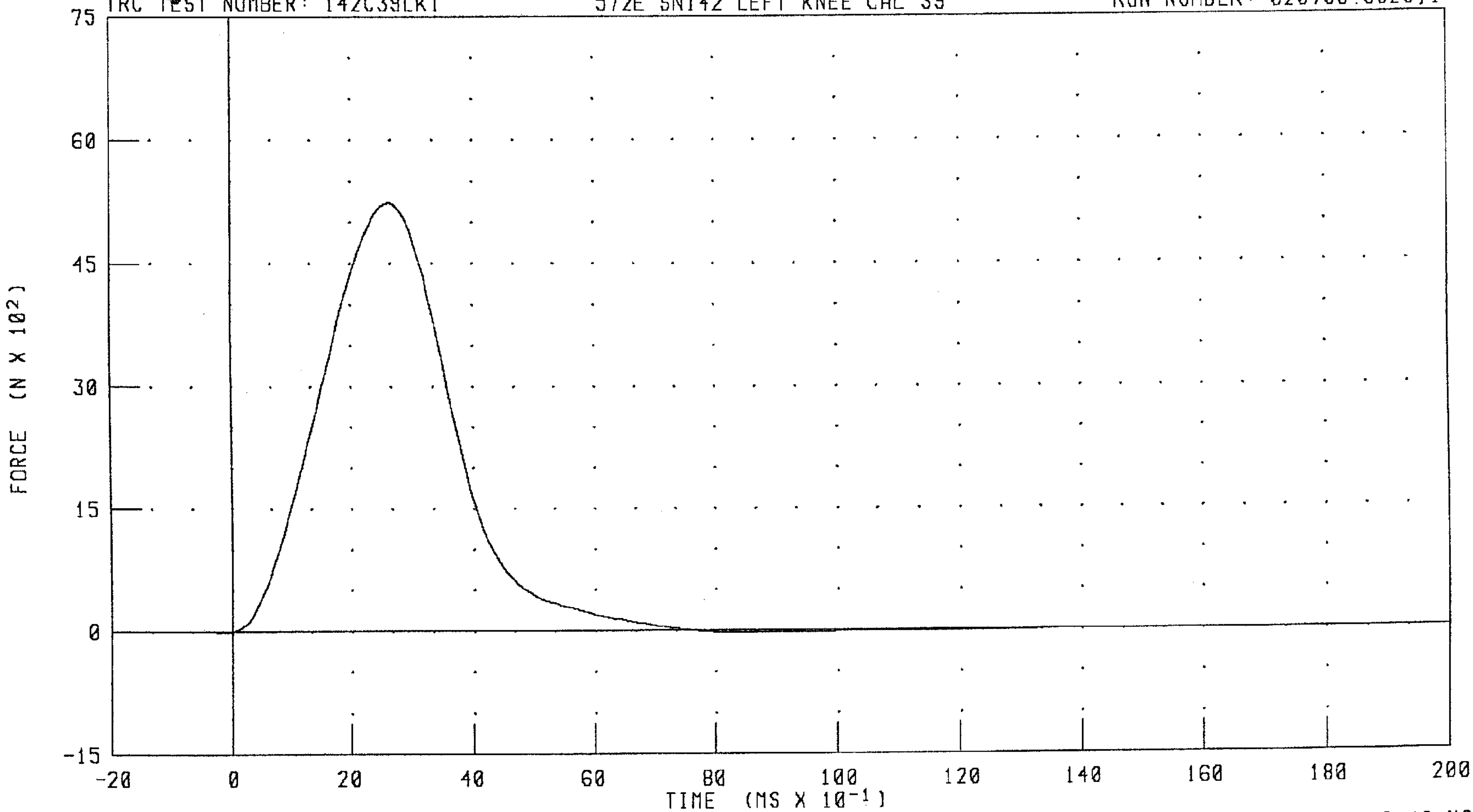


CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 107.09 G @ 2.64 MS; -0.50 G @ 8.48 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 142C39LK1 572E SN142 LEFT KNEE CAL 39 RUN NUMBER: 020798.0929;1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 5239.85 N @ 2.64 MS; -24.24 N @ 8.48 MS

Appendix D

Miscellaneous Test Information

Dummy Instrument Calibrations
Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Calibration Date Due
Head X-axis accelerometer	AAL54	7264	Endevco	01/05/98	07/05/98
Head X-axis accelerometer-redundant	AJ8J7	7264	Endevco	01/05/98	07/05/98
Head Y-axis accelerometer	AAMP6	7264	Endevco	01/05/98	07/05/98
Head Y-axis accelerometer-redundant	J15391	7264	Endevco	01/05/98	07/05/98
Head Z-axis accelerometer	ACB35	7264	Endevco	01/05/98	07/05/98
Head Z-axis accelerometer-redundant	AC8W6	7264	Endevco	01/05/98	07/05/98
Chest X-axis accelerometer	ACCD0	7264	Endevco	01/05/98	07/05/98
Chest X-axis accelerometer-redundant	A79GJ	7264	Endevco	01/05/98	07/05/98
Chest Y-axis accelerometer	ACC82	7264	Endevco	01/05/98	07/05/98
Chest Y-axis accelerometer-redundant	AGR69	7264	Endevco	01/05/98	07/05/98
Chest Z-axis accelerometer	ACC59	7264	Endevco	01/05/98	07/05/98
Chest Z-axis accelerometer-redundant	AAL82	7264	Endevco	01/05/98	07/05/98
Left femur force load cell	263	2121	Denton	01/05/98	07/05/98
Right femur force load cell	264	2121	Denton	01/05/98	07/05/98
Neck X-axis force load cell	445	1716	Denton	10/01/97	04/01/98
Neck Y-axis force load cell	445	1716	Denton	10/01/97	04/01/98
Neck Z-axis force load cell	445	1716	Denton	10/01/97	04/01/98
Neck Moment about X-axis load cell	445	1716	Denton	10/01/97	04/01/98
Neck Moment about Y-axis load cell	445	1716	Denton	10/01/97	04/01/98
Neck Moment about Z-axis load cell	445	1716	Denton	10/01/97	04/01/98
Pelvis X-axis accelerometer	AJ694	7264	Endevco	01/05/98	07/05/98
Pelvis Y-axis accelerometer	J15376	7264	Endevco	01/05/98	07/05/98
Pelvis Z-axis accelerometer	AJ788	7264	Endevco	01/05/98	07/05/98
Chest deflection potentiometer	87313-96	14CB1-2981	Vernitech	01/05/98	07/05/98
Lap belt force load cell	143	3419	Lebow	01/02/98	07/02/98
Shoulder belt force load cell	243	3419	Lebow	01/02/98	07/02/98

Dummy Instrument Calibrations, Cont'd.
Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Calibration Date Due
Left upper tibia moment about X-axis load cell	039-MX	1583	Denton	09/26/97	03/26/98
Left upper tibia moment about Y-axis load cell	039-MY	1583	Denton	09/26/97	03/26/98
Right upper tibia moment about X-axis load cell	036-MX	1583	Denton	09/26/97	03/26/98
Right upper tibia moment about Y-axis load cell	036-MY	1583	Denton	09/26/97	03/26/98
Left Lower tibia X-axis force load cell	033-FY	1584	Denton	09/26/97	03/26/98
Left Lower tibia Z-axis force load cell	033-FZ	1584	Denton	09/26/97	03/26/98
Left Lower tibia moment about Y-axis load cell	033-MX	1584	Denton	09/26/97	03/26/98
Right Lower tibia X-axis force load cell	040-FY	1584	Denton	09/26/97	03/26/98
Right Lower tibia Z-axis force load cell	040-FZ	1584	Denton	09/26/97	03/26/98
Right Lower tibia moment about Y-axis load cell	040-MX	1584	Denton	09/26/97	03/26/98
Left foot X-axis accelerometer	10073	7264	Endevco	01/05/98	07/05/98
Left foot heel Z-axis accelerometer	10263	7264	Endevco	01/05/98	07/05/98
Left foot toe Z-axis accelerometer	10101	7264	Endevco	01/05/98	07/05/98
Right foot X-axis accelerometer	APYT4	7264	Endevco	01/05/98	07/05/98
Right foot heel Z-axis accelerometer	AP0R8	7264	Endevco	01/05/98	07/05/98
Right foot toe Z-axis accelerometer	10076	7264	Endevco	01/05/98	07/05/98

Dummy Instrument Calibrations, Cont'd.

Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
eft knee left sensor	036	1587	Denton	09/26/97	03/26/98
Left knee right sensor	036	1587	Denton	09/26/97	03/26/98
ight knee left sensor	043	1587	Denton	09/26/97	03/26/98
Right knee right sensor	043	1587	Denton	09/26/97	03/26/98

Dummy Instrument Calibrations, Cont'd.
Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Head X-axis accelerometer	ACC63	7264	Endevco	01/05/98	07/05/98
Head X-axis accelerometer-redundant	AC8L5	7264	Endevco	01/05/98	07/05/98
Head Y-axis accelerometer	ACC02	7264	Endevco	01/05/98	07/05/98
Head Y-axis accelerometer-redundant	ACCR7	7264	Endevco	01/05/98	07/05/98
Head Z-axis accelerometer	ACCF3	7264	Endevco	01/05/98	07/05/98
Head Z-axis accelerometer-redundant	A68JJ	7264	Endevco	01/05/98	07/05/98
Chest X-axis accelerometer	ACC14	7264	Endevco	01/05/98	07/05/98
Chest X-axis accelerometer-redundant	A65JJ	7264	Endevco	01/05/98	07/05/98
Chest Y-axis accelerometer	ACCR0	7264	Endevco	01/05/98	07/05/98
Chest Y-axis accelerometer-redundant	FH14J	7264	Endevco	01/05/98	07/05/98
Chest Z-axis accelerometer	ACCT5	7264	Endevco	01/05/98	07/05/98
Chest Z-axis accelerometer-redundant	AC745	7264	Endevco	01/05/98	07/05/98
Left femur force load cell	257	2121	Denton	01/05/98	07/05/98
Right femur force load cell	258	2121	Denton	01/05/98	07/05/98
Neck X-axis force load cell[1]	441	1716	Denton	10/01/97	04/01/98
Neck Y-axis force load cell[1]	441	1716	Denton	10/01/97	04/01/98
Neck Z-axis force load cell[1]	441	1716	Denton	10/01/97	04/01/98
Neck Moment about X-axis load cell[1]	441	1716	Denton	10/01/97	04/01/98
Neck Moment about Y-axis load cell[1]	441	1716	Denton	10/01/97	04/01/98
Neck Moment about Z-axis load cell[1]	441	1716	Denton	10/01/97	04/01/98
Pelvis X-axis accelerometer	CY63H	7264	Endevco	01/05/98	07/05/98
Pelvis Y-axis accelerometer	AMWA9	7264	Endevco	01/05/98	07/05/98
Pelvis Z-axis accelerometer	ANA55	7264	Endevco	01/05/98	07/05/98
Chest deflection potentiometer	142	14CB1-2981	Servo	01/05/98	07/05/98
Lap belt force load cell	615	3419	Lebow	01/02/98	07/02/98
Shoulder belt force load cell	134	3419	Lebow	01/02/98	07/02/98

Dummy Instrument Calibrations, Cont'd.
Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
eft upper tibia moment about X-axis load cell	023-MX	1583	Denton	09/26/97	03/26/98
eft upper tibia moment about -axis load cell	023-MY	1583	Denton	09/26/97	03/26/98
Right upper tibia moment about -axis load cell	040-MX	1583	Denton	09/26/97	03/26/98
Right upper tibia moment about -axis load cell	040-MY	1583	Denton	09/26/97	03/26/98
eft Lower tibia X-axis force load cell	019-FY	1584	Denton	09/26/97	03/26/98
eft Lower tibia Z-axis orce load cell	019-FZ	1584	Denton	09/26/97	03/26/98
eft Lower tibia moment about -axis load cell	019-MX	1584	Denton	09/26/97	03/26/98
ight Lower tibia X-axis force load cell	034-FY	1584	Denton	09/26/97	03/26/98
ight Lower tibia Z-axis force load cell	034-FZ	1584	Denton	09/26/97	03/26/98
ight Lower tibia moment about -axis load cell	034-MX	1584	Denton	09/26/97	03/26/98
eft foot X-axis accelerometer	APA01	7264	Endevco	01/05/98	07/05/98
Left foot heel Z-axis accelerometer	J14136	7264	Endevco	01/05/98	07/05/98
eft foot toe Z-axis accelerometer	DW58JC	7264	Endevco	01/05/98	07/05/98
ight foot X-axis accelerometer	10088	7264	Endevco	01/05/98	07/05/98
Right foot heel Z-axis accelerometer	10089	7264	Endevco	01/05/98	07/05/98
ight foot toe Z-axis accelerometer	10087	7264	Endevco	01/05/98	07/05/98

Dummy Instrument Calibrations, Cont'd.
Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Due
Left knee left sensor	045	1587	Denton	09/26/97	03/26/98
Left knee right sensor	045	1587	Denton	09/26/97	03/26/98
Right knee left sensor	037	1587	Denton	09/26/97	03/26/98
Right knee right sensor	037	1587	Denton	09/26/97	03/26/98

Vehicle and Calibration Laboratory Instrument Calibrations

Vehicle Accelerometers

	Serial Number	Model Number	Manufacturer	Calibration Date Last	Calibration Date Due
Left rear seat crossmember X-axis	J19253	7264	Endevco	10/15/98	04/15/98
Left rear seat crossmember X-axis redundant	J19954	7264	Endevco	02/15/98	08/15/98
Right rear seat crossmember X-axis	AJ797	7264	Endevco	02/17/98	08/17/98
Right rear seat crossmember X-axis redundant	CJ13H	7264	Endevco	02/16/98	08/16/98
Engine top X-axis	J19943	7264	Endevco	02/15/98	08/15/98
Engine bottom X-axis	96G01-Z17	EGE-73BE0QT	Entran	02/16/98	08/16/98
Right brake caliper X-axis	J22049	7264	Endevco	11/13/97	05/13/98
Left brake caliper X-axis	J20037	7264	Endevco	12/16/97	06/16/98
Instrument panel center X-axis	J19557	7264	Endevco	10/28/97	04/28/98

Calibration Laboratory Instruments

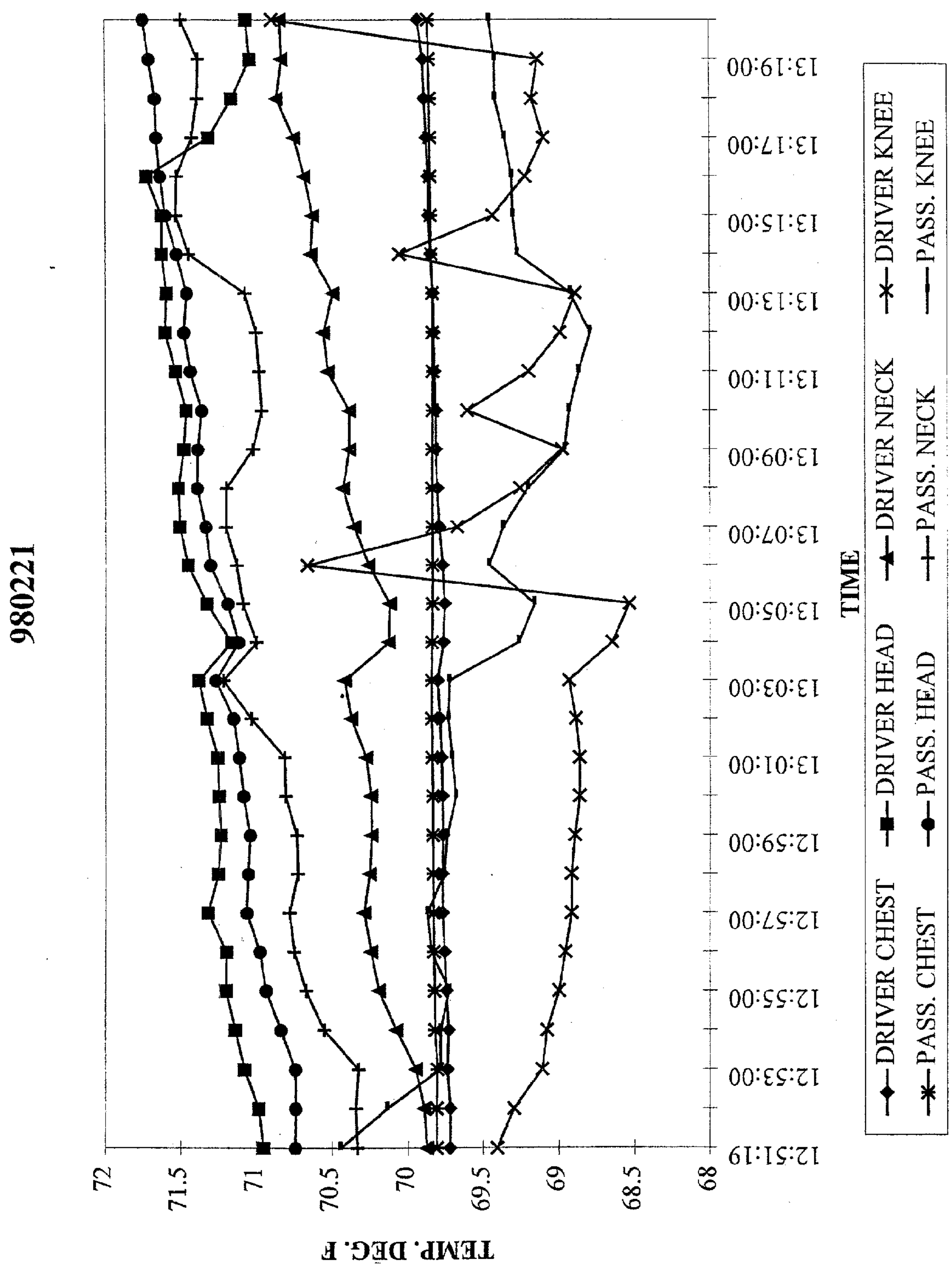
	Serial Number	Model Number	Manufacturer	Calibration Date Last	Calibration Date Due
Neck bending pendulum accelerometer	CB27	7232	Endevco	09/18/97	03/18/98
Neck bending rotary potentiometer	6	6657S	Bournes	02/04/98	08/04/98
Neck bending rotary potentiometer	7	6657S	Bournes	09/04/97	08/04/98
Thorax/Hybrid III femur pendulum accelerometer	CC64	7232	Endevco	09/18/97	03/18/98
Hybrid III femur pendulum accelerometer	CB35	7232	Endevco	09/18/97	03/18/98

Sign Convention
NHTSA Data Tape Reference Guide

Accelerometers:	+X: Forward	
	+Y: Leftward	
	+Z: Upward	
Potentiometers:	+Chest longitudinal deflection:	Outward
	+Chest lateral deflection:	Leftward
	+Seat belt displacement:	Outward
	+Seat belt extension:	Elongation
	+Knee slider displacement:	Distance between femur and tibia increased (in relation to a seated dummy)
Load cells:	+Femur force:	Tension
	+Seat belt force:	Tension
	+Barrier force:	Tension
Neck load cells:	+X force:	Head pushed forward
	+Y force:	Head pushed leftward
	+Z force:	Head pulled upward (tension on neck)
	+X moment:	Right ear rotating toward right shoulder
	+Y moment:	Chin rotating toward chest
	+Z moment:	Chin rotating toward left shoulder
Tibia load cells:	+X force:	Tension
	+Y force:	Tension
	+Z force:	Tension
	+X moment:	Bottom of tibia moving leftward
	+Y moment:	Bottom of tibia moving rearward

Frequency Response Classes
SAE J211 OCT88

Typical Test Measurements	Channel Class
Vehicle Structural Accelerations for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Barrier Face Forces	60
Belt Restraint System Loads	60
Anthropomorphic Test Device	
Head accelerations (linear and angular)	1000
Neck	
Forces	1000
Moments	600
Thorax	
Spine accelerations	180
Rib accelerations	1000
Sternum accelerations	1000
Deflections	180
Lumbar	
Forces	1000
Moments	1000
Pelvis	
Accelerations	1000
Forces	1000
Moments	1000
Femur/Knee/Tibia/Ankle	
Forces	600
Moments	600
Displacements	180
Sled Accelerations	60
Steering Column Loads	600
Head form Accelerations	1000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TEMP. DEG. F
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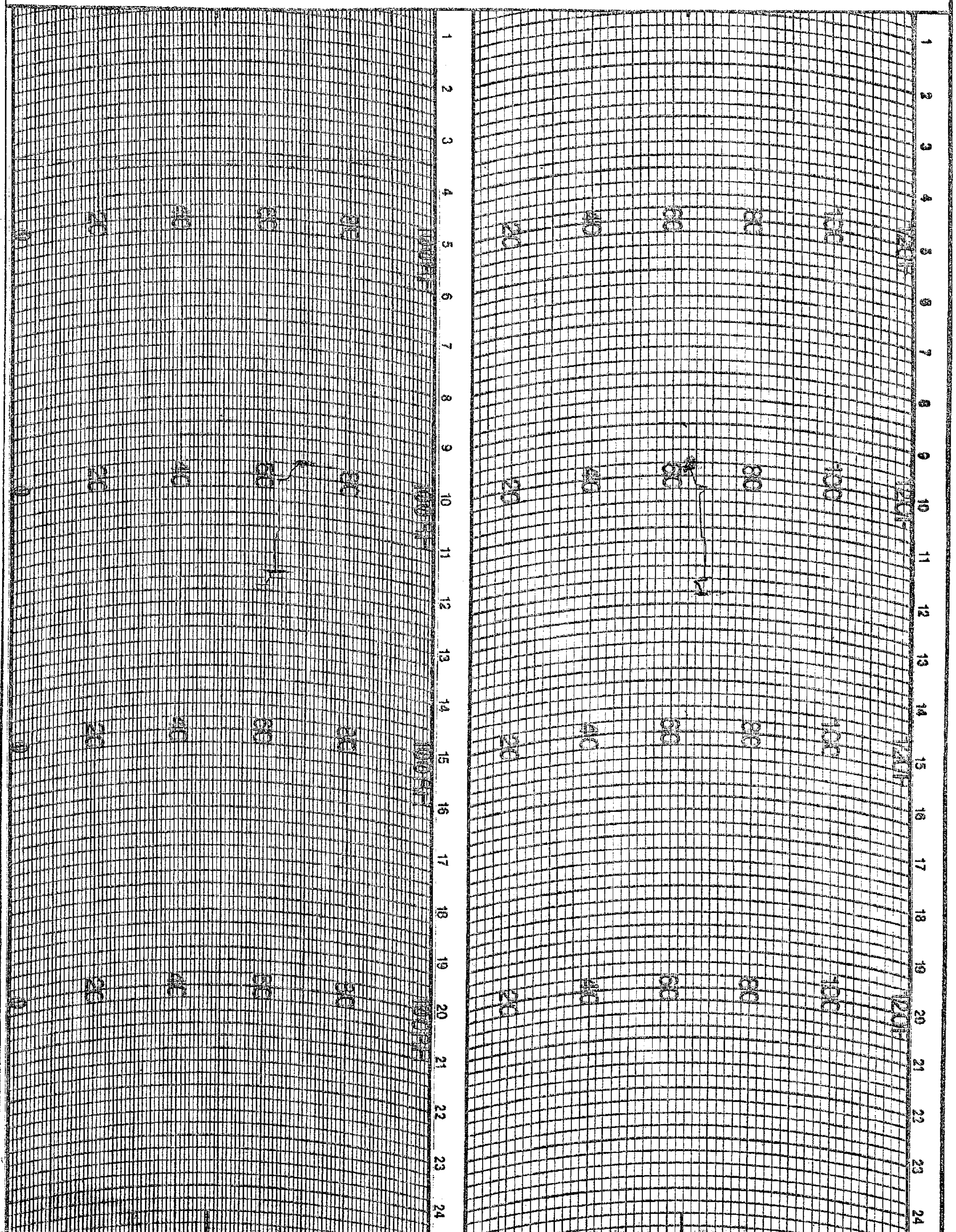
DRIVER CHEST
DRIVER HEAD
DRIVER NECK
DRIVER KNEE
PASS. CHEST
PASS. HEAD
PASS. NECK
PASS. KNEE



WEATHER MEASURE
P.O. BOX 41257
SACRAMENTO, CA. 95841
PHONE (916)481-7565

HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HF
PART # 699123

STATION ________ DATE ON 2-21-98 DATE OFF ________

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Appendix E

Restraint System Instructions from Owner's Manual

Section 1 Seats and Restraint Systems

Here you'll find information about the seats in your Oldsmobile and how to use your safety belts properly. You can also learn about some things you should *not* do with air bags and safety belts.

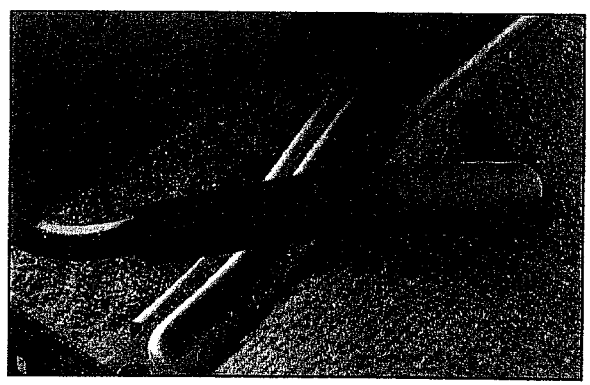
Seats and Seat Controls

This section tells you how to adjust the seats and explains reclining seatbacks, folding rear seats and head restraints.

Manual Front Seat

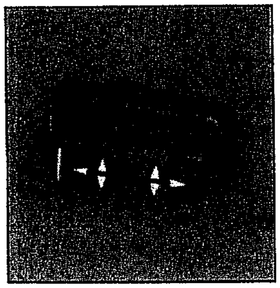
⚠ CAUTION:

You can lose control of the vehicle if you try to adjust a manual driver's seat while the vehicle is moving. The sudden movement could startle and confuse you, or make you push a pedal when you don't want to. Adjust the driver's seat only when the vehicle is not moving.



Lift the lever under the front of the seat up, using a twisting motion. This will unlock the seat. Slide the seat to where you want it and release the lever. Try to move the seat with your body to be sure the seat is locked into place.

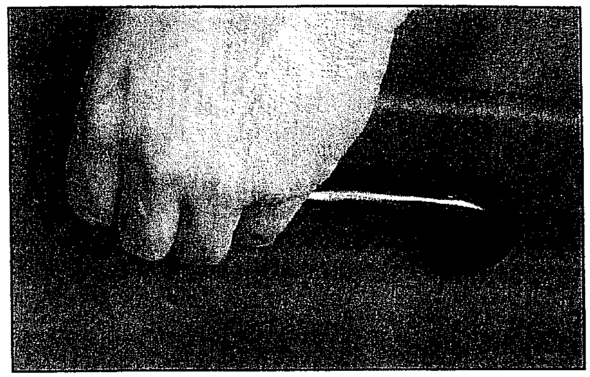
6-Way Power Seat (If Equipped)



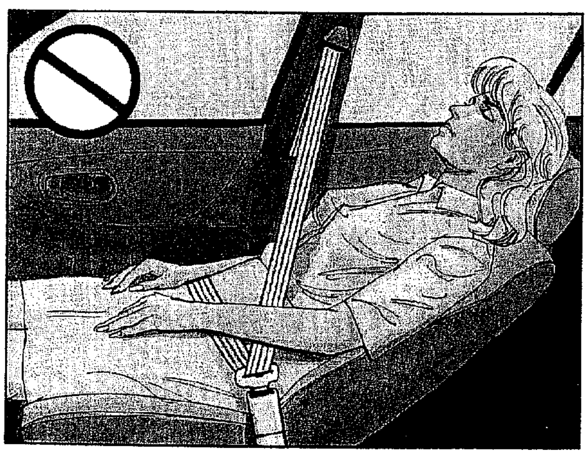
This switch is designed to imitate the movements of your seat cushion. It is located on the left side of the driver's or the right side of the passenger's seat cushion.

To move the seat forward or rearward, push the switch forward or rearward. To raise or lower the seat, push the switch up or down. To raise or lower the front portion of your seat, push the front of the switch up or down. To raise or lower the rear portion of your seat, push the rear of the switch up or down.

Reclining Front Seatbacks



Lift the lever to release the seatback, then move the seatback to where you want it. Release the lever to lock the seatback in place. Pull up on the lever without pushing on the seatback and the seatback will move forward.



But don't have a seatback reclined if your vehicle is moving.

CAUTION:

Sitting in a reclined position when your vehicle is in motion can be dangerous. Even if you buckle up, your safety belts can't do their job when you're reclined like this.

The shoulder belt can't do its job because it won't be against your body. Instead, it will be in front of you. In a crash you could go into it, receiving neck or other injuries.

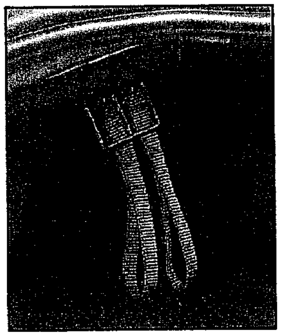
The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones. This could cause serious internal injuries.

For proper protection when the vehicle is in motion, have the seatback upright. Then sit well back in the seat and wear your safety belt properly.

Head Restraints

Slide the head restraint up or down so that the top of the restraint is closest to the top of your ears. This position reduces the chance of a neck injury in a crash.

Split Folding Rear Seat



Pull the seat tab latch forward to fold down the rear seatback or pull the remote release straps in the trunk. To return the seat to its original position, push it back up and make sure it latches.

Safety Belts: They're for Everyone

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts.

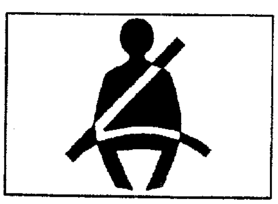
And it explains the Supplemental Restraint System (SRS), or air bag system.

⚠ CAUTION:

Don't let anyone ride where he or she can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.

⚠ CAUTION:

It is extremely dangerous to ride in a cargo area, inside or outside of a vehicle. In a collision, people riding in these areas are more likely to be seriously injured or killed. Do not allow people to ride in any area of your vehicle that is not equipped with seats and safety belts. Be sure everyone in your vehicle is in a seat and using a safety belt properly.



Your vehicle has a light that comes on as a reminder to buckle up. (See "Safety Belt Reminder Light" in the Index.)

In most states and Canadian provinces, the law says to wear safety belts. Here's why: *They work.*

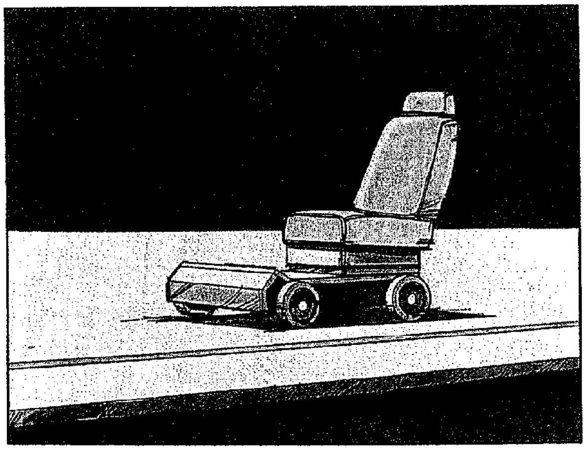
You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

A few crashes are mild, and some crashes can be so serious that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could have been badly hurt or killed.

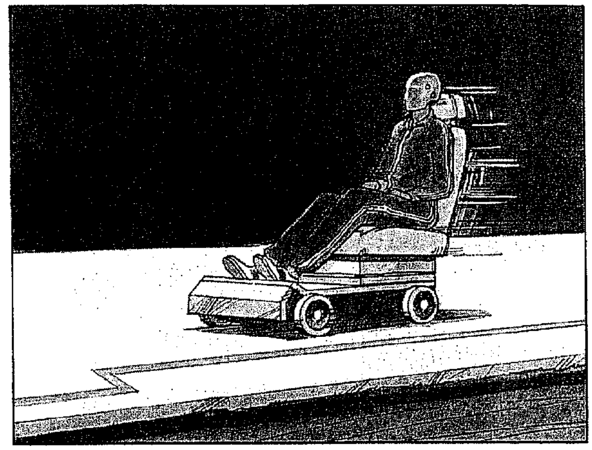
After more than 30 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter ... a lot!

Why Safety Belts Work

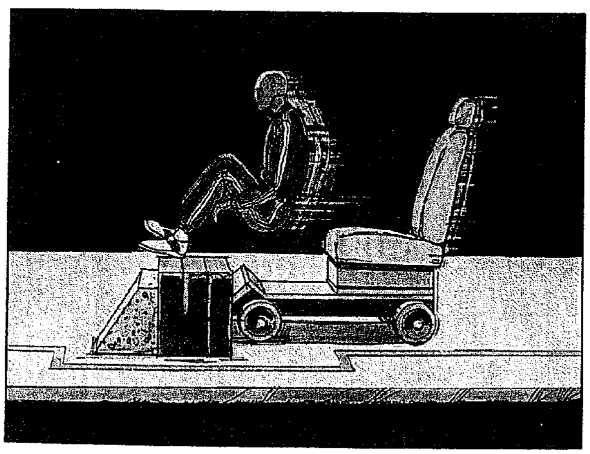
When you ride in or on anything, you go as fast as it goes.



Take the simplest vehicle. Suppose it's just a seat on wheels.



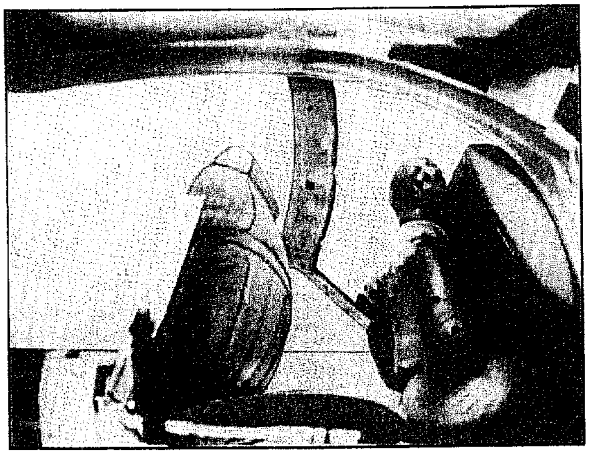
Put someone on it.



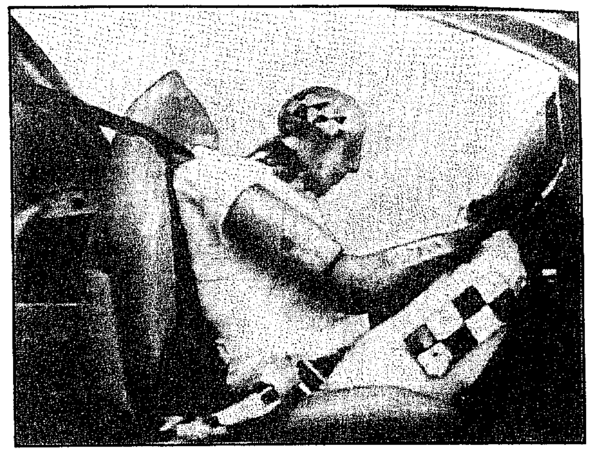
Get it up to speed. Then stop the vehicle. The rider doesn't stop.

The person keeps going until stopped by something.

In a real vehicle, it could be the windshield ...



or the instrument panel ...



or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts -- and the Answers

Q: **Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?**

A: You *could* be -- whether you're wearing a safety belt or not. But you can unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you *can* unbuckle and get out, is *much* greater if you are belted.

Q: **If my vehicle has air bags, why should I have to wear safety belts?**

A: Air bags are in many vehicles today and will be in most of them in the future. But they are supplemental systems only; so they work *with* safety belts -- not instead of them. Every air bag system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has air bags, you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

Q: **If I'm a good driver, and I never drive far from home, why should I wear safety belts?**

A: You may be an excellent driver, but if you're in an accident -- even one that isn't your fault -- you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speeds of less than 40 mph (65 km/h).

Safety belts are for everyone.

How to Wear Safety Belts Properly

Adults

This part is only for people of adult size.

Be aware that there are special things to know about safety belts and children. And there are different rules for smaller children and babies. If a child will be riding in your vehicle, see the part of this manual called "Children." Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has.

We'll start with the driver position.

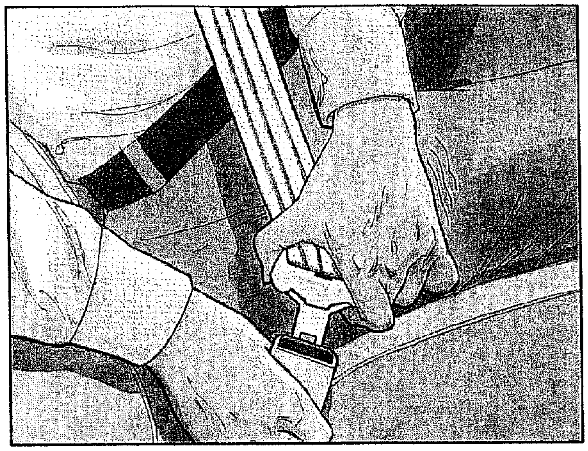
Driver Position

This part describes the driver's restraint system.

Lap-Shoulder Belt

The driver has a lap-shoulder belt. Here's how to wear it properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see "Seats" in the Index) so you can sit up straight.

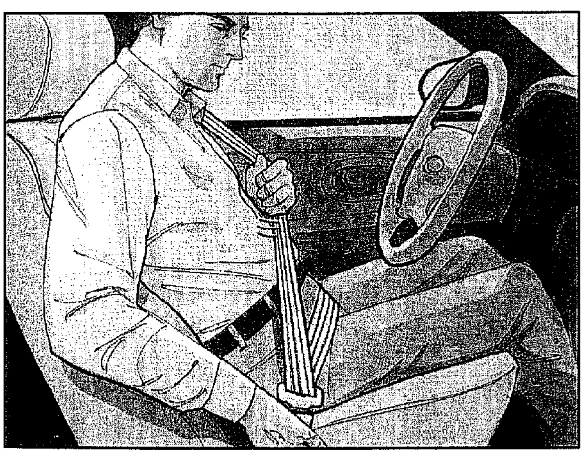


3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.

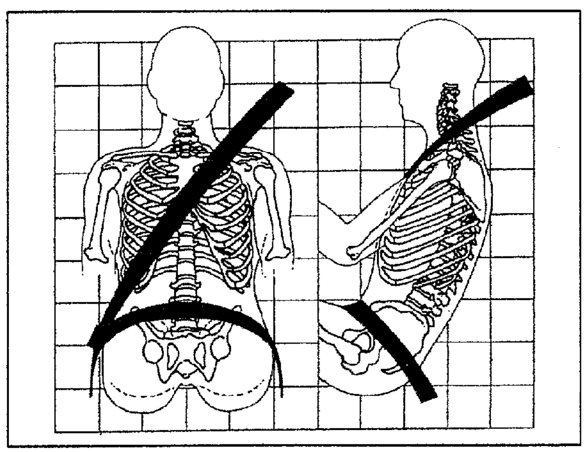
   The shoulder belt may lock if you pull the belt across you very quickly. If this happens, let the belt go back slightly to unlock it. Then pull the belt across you more slowly.
4. Push the latch plate into the buckle until it clicks.

   Pull up on the latch plate to make sure it is secure. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



5. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder belt.

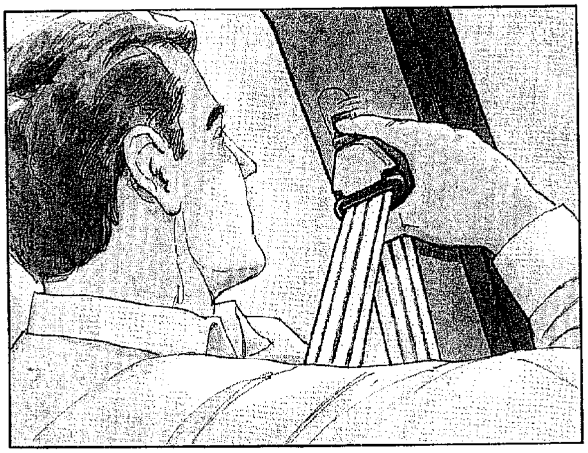


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or crash, or if you pull the belt very quickly out of the retractor.

Shoulder Belt Height Adjuster

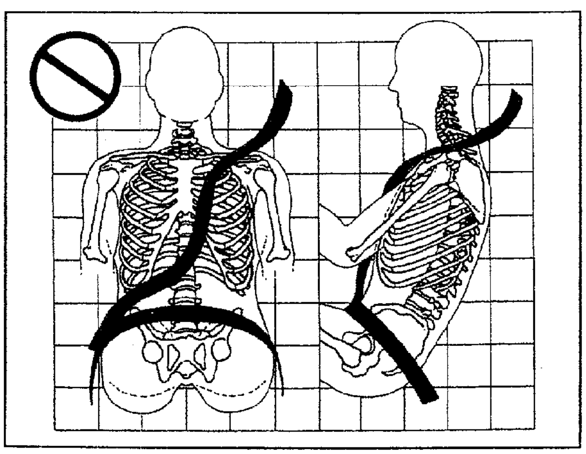
Before you begin to drive, move the shoulder belt adjuster to the height that is right for you.



To move it down, squeeze the release lever and move the height adjuster to the desired position. You can move the adjuster up just by pushing up on the shoulder belt guide. After you move the adjuster to where you want it, try to move it down without squeezing the release lever to make sure it has locked into position.

Adjust the height so that the shoulder portion of the belt is centered on your shoulder. The belt should be away from your face and neck, but not falling off your shoulder.

Q: **What's wrong with this?**

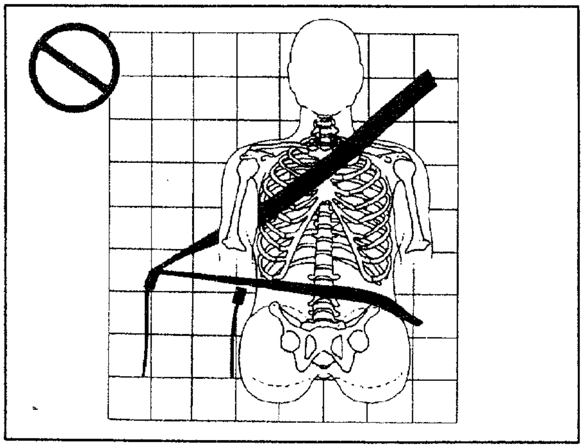


A: The shoulder belt is too loose. It won't give nearly as much protection this way.

⚠ CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

Q: What's wrong with this?

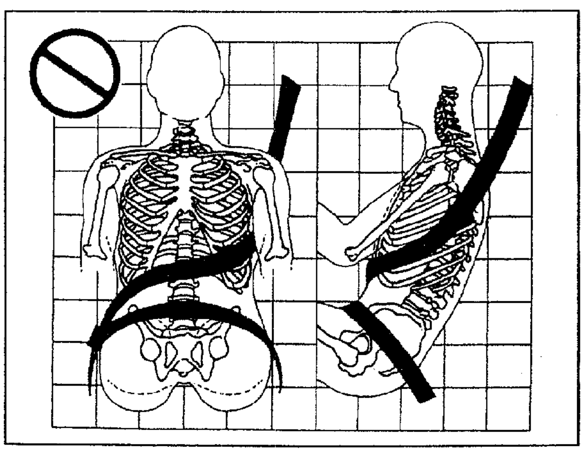


A: The belt is buckled in the wrong place.

⚠ CAUTION:

You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

Q: What's wrong with this?

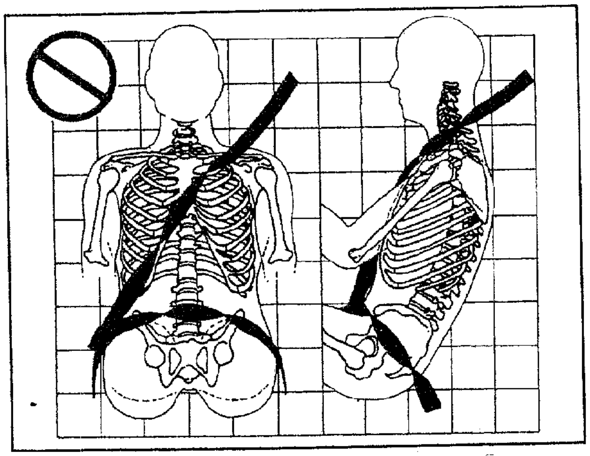


A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

⚠ CAUTION:

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

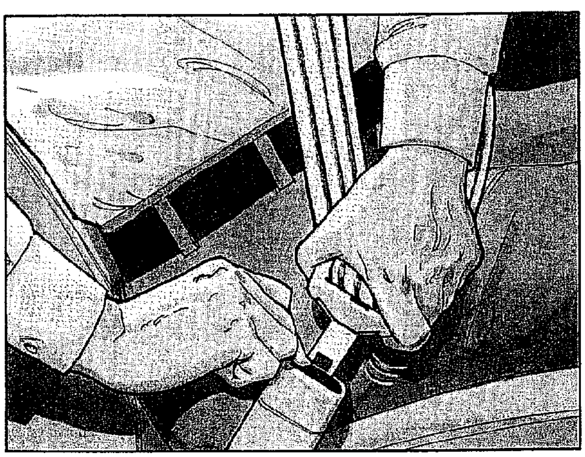
Q: What's wrong with this?



A: The belt is twisted across the body.

⚠ CAUTION:

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your retailer to fix it.

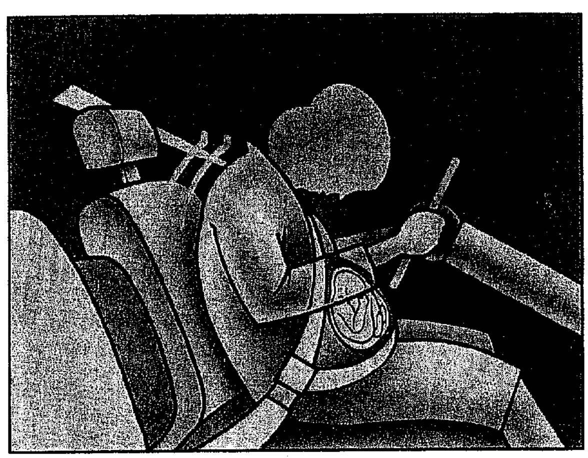


To unlatch the belt, just push the button on the buckle. The belt should go back out of the way.

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.



A pregnant woman should wear a lap-shoulder belt, and the lap portion should be worn as low as possible, below the rounding, throughout the pregnancy.

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

Right Front Passenger Position

To learn how to wear the right front passenger's safety belt properly, see "Driver Position" earlier in this section.

The right front passenger's safety belt works the same way as the driver's safety belt -- except for one thing. If you ever pull the shoulder portion of the belt out all the way, you will engage the child restraint locking feature. If this happens, just let the belt go back all the way and start again.

Supplemental Restraint System (SRS)

This part explains the Supplemental Restraint System (SRS) or air bag system.

Your vehicle has two air bags -- one air bag for the driver and another air bag for the right front passenger. The air bags in your vehicle may be "Next Generation" reduced-force frontal air bags.

If your vehicle has a label on the driver's side door window, then your vehicle has reduced-force frontal air bags. If your vehicle doesn't have a label, then the air bags in your vehicle aren't reduced-force.

Reduced-force frontal air bags are designed to help reduce the risk of injury from the force of an inflating air bag. But even these air bags must inflate very quickly if they are to do their job and comply with federal regulations.

Here are the most important things to know about the air bag system:

⚠ CAUTION:

You can be severely injured or killed in a crash if you aren't wearing your safety belt -- even if you have air bags. Wearing your safety belt during a crash helps reduce your chance of hitting things inside the vehicle or being ejected from it. Air bags are "supplemental restraints" to the safety belts. All air bags -- even reduced-force air bags -- are designed to work with safety belts, but don't replace them. Air bags are designed to work only in moderate to severe crashes where the front of your vehicle hits something. They aren't designed to inflate at all in rollover, rear, side or low-speed frontal crashes. And, for unrestrained occupants, reduced-force air bags may provide less protection in frontal crashes than more forceful air bags have provided in the past. Everyone in your vehicle should wear a safety belt properly -- whether or not there's an air bag for that person.

⚠ CAUTION:

Air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, it could seriously injure you. This is true even with reduced-force frontal air bags. Safety belts help keep you in position before and during a crash. Always wear your safety belt, even with reduced-force air bags. The driver should sit as far back as possible while still maintaining control of the vehicle.

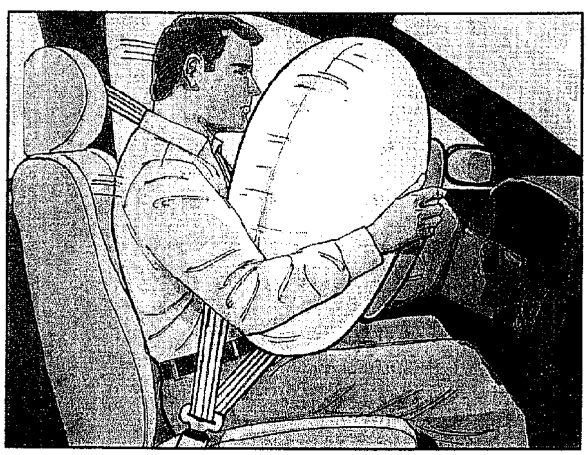
⚠ CAUTION:

Children who are up against, or very close to, an air bag when it inflates can be seriously injured or killed. This is true even if your vehicle has reduced-force frontal air bags. Air bags plus lap-shoulder belts offer the best protection for adults, but not for young children and infants. Neither the vehicle's safety belt system nor its air bag system is designed for them. Young children and infants need the protection that a child restraint system can provide. Always secure children properly in your vehicle. To read how, see the part of this manual called "Children" and see the caution labels on the sunvisors and the right front passenger's safety belt.

There is an air bag readiness light on the instrument panel, which shows an air bag symbol.

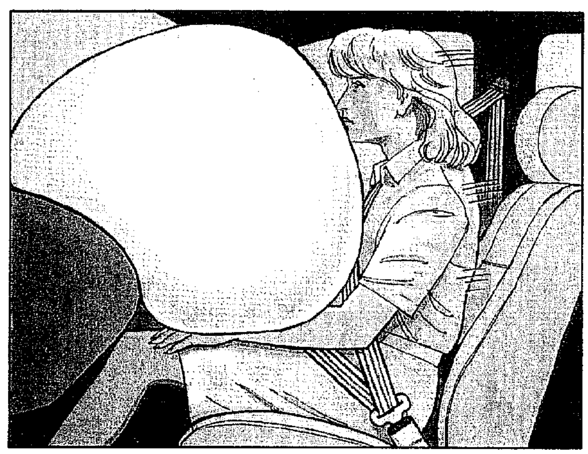
The system checks the air bag electrical system for malfunctions. The light tells you if there is an electrical problem. See "Air Bag Readiness Light" in the Index for more information.

How the Air Bag System Works



Where are the air bags?

The driver's air bag is in the middle of the steering wheel.



The right front passenger's air bag is in the instrument panel on the passenger's side.

⚠ CAUTION:

If something is between an occupant and an air bag, the bag might not inflate properly or it might force the object into that person. The path of an inflating air bag must be kept clear. Don't put anything between an occupant and an air bag, and don't attach or put anything on the steering wheel hub or on or near any other air bag covering.

When should an air bag inflate?

An air bag is designed to inflate in a moderate to severe frontal or near-frontal crash. The air bag will inflate only if the impact speed is above the system's designed "threshold level." If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 9 to 15 mph (14 to 24 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range. If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The air bag is not designed to inflate in rollovers, side impacts or rear impacts, because inflation would not help the occupant.

In any particular crash, no one can say whether an air bag should have inflated simply because of the damage to a vehicle or because of what the repair costs were. Inflation is determined by the angle of the impact and how quickly the vehicle slows down in frontal or near-frontal impacts.

What makes an air bag inflate?

In an impact of sufficient severity, the air bag sensing system detects that the vehicle is in a crash. The sensing system triggers a release of gas from the inflator, which inflates the air bag. The inflator, air bag and related hardware are all part of the air bag modules inside the steering wheel and in the instrument panel in front of the right front passenger.

How does an air bag restrain?

In moderate to severe frontal or near-frontal collisions, even belted occupants can contact the steering wheel or the instrument panel. Air bags supplement the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant more gradually. But air bags would not help you in many types of collisions, including rollovers, rear impacts and side impacts, primarily because an occupant's motion is not toward those air bags. Air bags should never be regarded as anything more than a supplement to safety belts, and then only in moderate to severe frontal or near-frontal collisions.

What will you see after an air bag inflates?

After an air bag inflates, it quickly deflates, so quickly that some people may not even realize the air bag inflated. Some components of the air bag module -- the steering wheel hub for the driver's air bag, or the instrument panel for the right front passenger's bag -- will be hot for a short time. The parts of the bag that come into contact with you may be warm, but not too hot to touch. There will be some smoke and dust coming from vents in the deflated air bags. Air bag inflation doesn't prevent the driver from seeing or from being able to steer the vehicle, nor does it stop people from leaving the vehicle.

⚠ CAUTION:

When an air bag inflates, there is dust in the air. This dust could cause breathing problems for people with a history of asthma or other breathing trouble. To avoid this, everyone in the vehicle should get out as soon as it is safe to do so. If you have breathing problems but can't get out of the vehicle after an air bag inflates, then get fresh air by opening a window or door.

In many crashes severe enough to inflate an air bag, windshields are broken by vehicle deformation. Additional windshield breakage may also occur from the right front passenger air bag.

- Air bags are designed to inflate only once. After they inflate, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.
- Your vehicle is equipped with a crash sensing and diagnostic module, which records information about the air bag system. The module records information about the readiness of the system, when the sensors are activated and driver's safety belt usage at deployment.
- Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your retailer for service.

NOTICE:

If you damage the covering for the driver's or the right front passenger's air bag, the bag may not work properly. You may have to replace the air bag module in the steering wheel or both the air bag module and the instrument panel for the right front passenger's air bag. Do not open or break the air bag coverings.

If your vehicle ever gets into a lot of water -- such as water up to the carpeting or higher -- or if water enters your vehicle and soaks the carpet, the air bag controller can be soaked and ruined. If this ever happens, and then you start your vehicle, the damage could make the air bags inflate, even if there's no crash. You would have to replace the air bags as well as the sensors and related parts. If your vehicle is ever in a flood, or if it's exposed to water that soaks the carpet, you can avoid needless repair costs by turning off the vehicle immediately. Don't let anyone start the vehicle, even to tow it, unless the battery cables are first disconnected.

Servicing Your Air Bag-Equipped Vehicle

Air bags affect how your vehicle should be serviced. There are parts of the air bag system in several places around your vehicle. You don't want the system to inflate while someone is working on your vehicle. Your retailer and the Intrigue Service Manual have information about servicing your vehicle and the air bag system. To purchase a service manual, see "Service and Owner Publications" in the Index.

⚠ CAUTION:

For up to 10 minutes after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid yellow connectors. They are probably part of the air bag system. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.

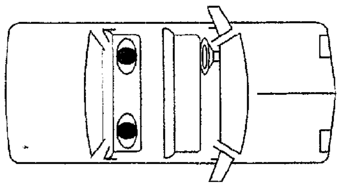
The air bag system does not need regular maintenance.

Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

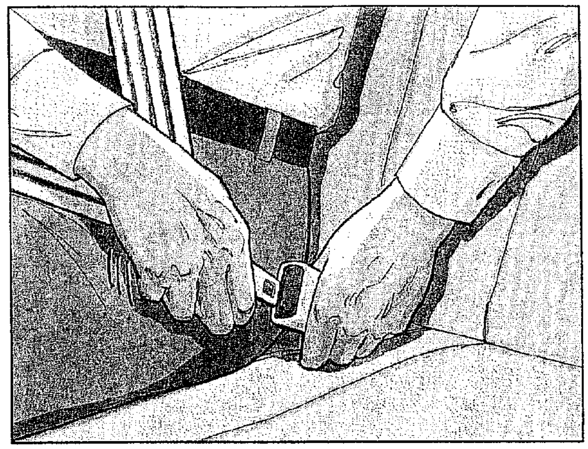
Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

Rear Seat Outside Passenger Positions



Lap-Shoulder Belt

The positions next to the windows have lap-shoulder belts. Here's how to wear one properly.



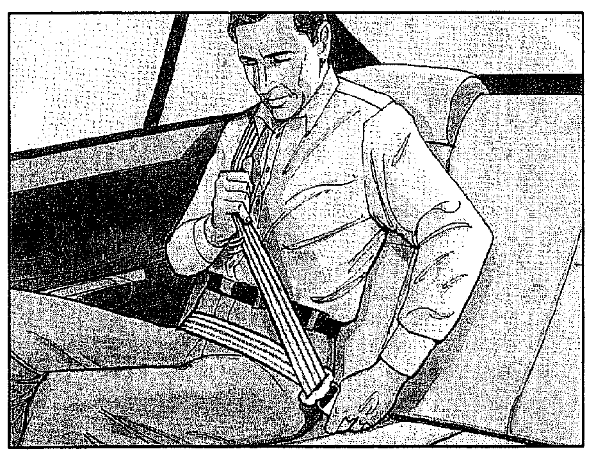
1. Pick up the latch plate and pull the belt across you. Don't let it get twisted.

   The shoulder belt may lock if you pull the belt across you very quickly. If this happens, let the belt go back slightly to unlock it. Then pull the belt across you more slowly.

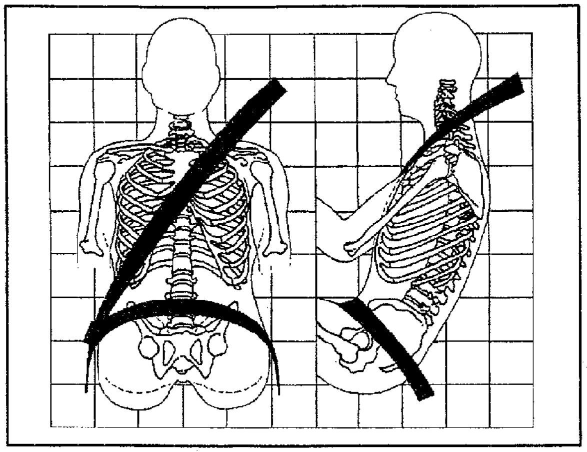
2. Push the latch plate into the buckle until it clicks.

   Pull up on the latch plate to make sure it is secure.

   When the shoulder belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again. If the belt is not long enough, see "Safety Belt Extender" at the end of this section. Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



3. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.

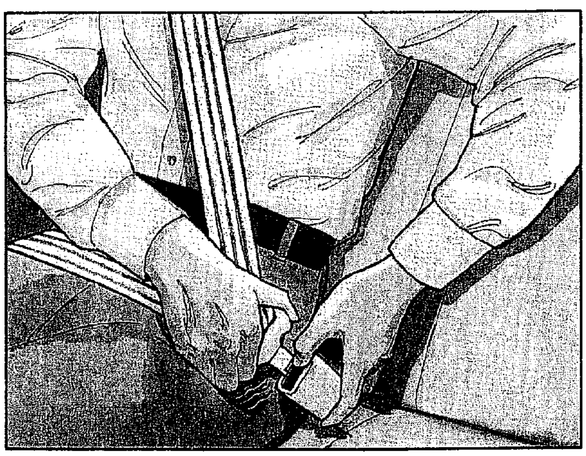


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash, or if you pull the belt very quickly out of the retractor.

⚠ CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.



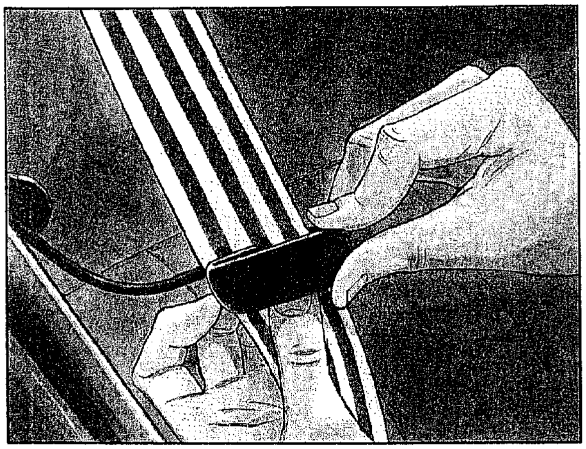
To unlatch the belt, just push the button on the buckle.

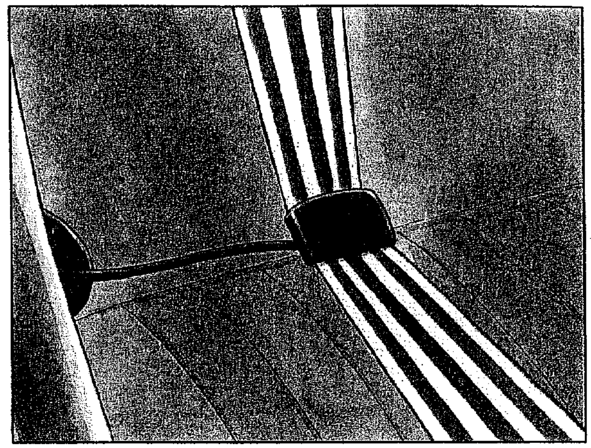
Rear Safety Belt Comfort Guides for Children and Small Adults

Rear shoulder belt comfort guides will provide added safety belt comfort for children who have outgrown child restraints and for small adults. When installed on a shoulder belt, the comfort guide pulls the belt away from the neck and head.

There is one guide for each outside passenger position in the rear seat. To provide added safety belt comfort for children who have outgrown child restraints and for smaller adults, the comfort guides may be installed on the shoulder belts. Here's how to install a comfort guide and use the safety belt:

1. Pull the elastic cord out from between the edge of the seatback and the interior body to remove the guide from its storage clip.





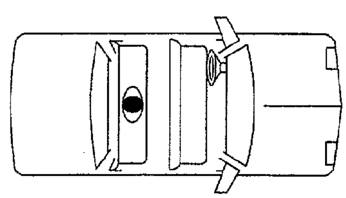
2. Slide the guide under and past the belt. The elastic cord must be under the belt. Then, place the guide over the belt, and insert the two edges of the belt into the slots of the guide.

3. Be sure that the belt is not twisted and it lies flat. The elastic cord must be under the belt and the guide on top.

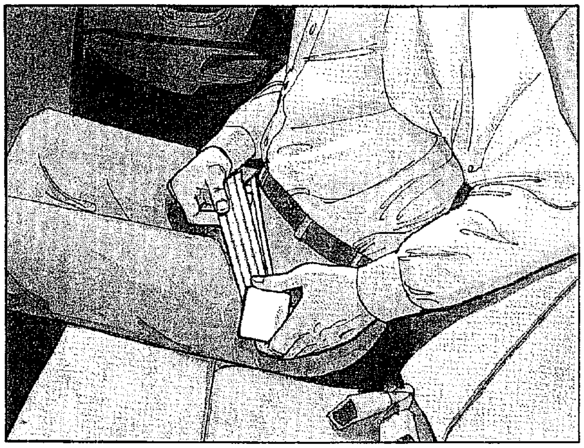
4. Buckle, position and release the safety belt as described in "Rear Seat Outside Passenger Positions" earlier in this section. Make sure that the shoulder belt crosses the shoulder.

To remove and store the comfort guides, squeeze the belt edges together so that you can take them out from the guides. Pull the guide upward to expose its storage clip, and then slide the guide onto the clip. Rotate the guide and clip inward and in between the seatback and the interior body, leaving only the loop of elastic cord exposed.

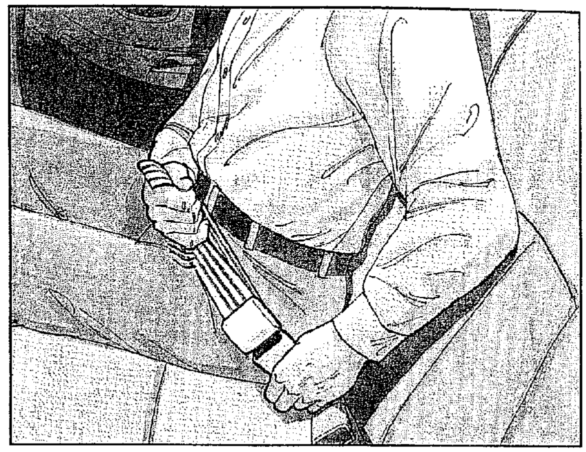
Center Passenger Position



Lap Belt



When you sit in the center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.



To make the belt shorter, pull its free end as shown until the belt is snug.

Buckle, position and release it the same way as the lap part of a lap-shoulder belt. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

Children

Everyone in a vehicle needs protection! That includes infants and all children smaller than adult size. Neither the distance traveled nor the age and size of the traveler changes the need, for everyone, to use safety restraints. In fact, the law in every state in the United States and in every Canadian province says children up to some age must be restrained while in a vehicle.

Smaller Children and Babies

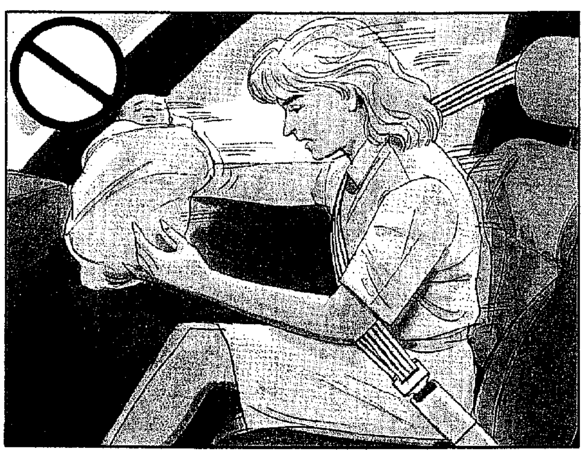
⚠ CAUTION:

Children who are up against, or very close to, any air bag when it inflates can be seriously injured or killed. This is true even if your vehicle has reduced-force frontal air bags. Air bags plus lap-shoulder belts offer the best protection for adults, but not for young children and infants. Neither the vehicle's safety belt system nor its air bag system is designed for them. Young children and infants need the protection that a child restraint system can provide. Always secure children properly in your vehicle.

⚠ CAUTION:

Smaller children and babies should always be restrained in a child or infant restraint. The instructions for the restraint will say whether it is the right type and size for your child. A very young child's hip bones are so small that a regular belt might not stay low on the hips, as it should. Instead, the belt will likely be over the child's abdomen. In a crash, the belt would apply force right on the child's abdomen, which could cause serious or fatal injuries. So, be sure that any child small enough for one is always properly restrained in a child or infant restraint.

Infants need complete support, including support for the head and neck. This is necessary because an infant's neck is weak and its head weighs so much compared with the rest of its body. In a crash, an infant in a rear-facing restraint settles into the restraint, so the crash forces can be distributed across the strongest part of the infant's body, the back and shoulders. A baby should be secured in an appropriate infant restraint. This is so important that many hospitals today won't release a newborn infant to its parents unless there is an infant restraint available for the baby's first trip in a motor vehicle.



⚠ CAUTION:

Never hold a baby in your arms while riding in a vehicle. A baby doesn't weigh much -- until a crash. During a crash a baby will become so heavy you can't hold it. For example, in a crash

CAUTION: (Continued)

CAUTION: (Continued)

at only 25 mph (40 km/h), a 12-lb. (5.5 kg) baby will suddenly become a 240-lb. (110 kg) force on your arms. The baby would be almost impossible to hold.

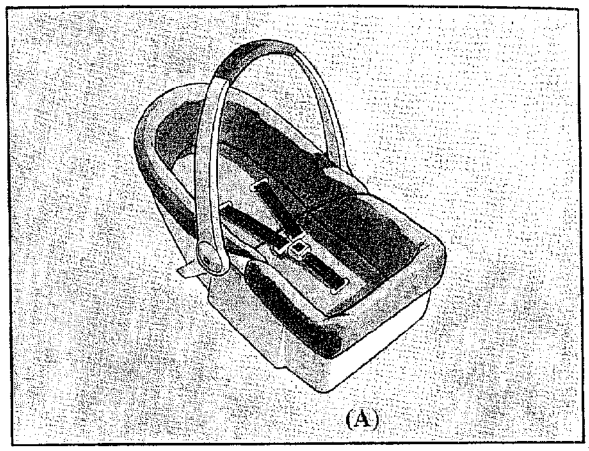
Secure the baby in an infant restraint.

Child Restraints

Every time infants and young children ride in vehicles, they should have protection provided by appropriate restraints.

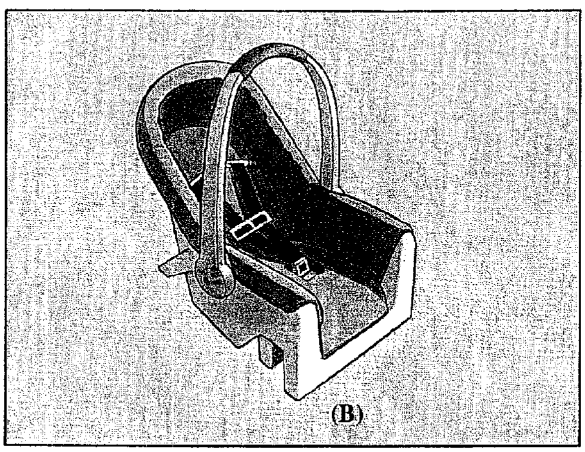
Q: What are the different types of add-on child restraints?

A: Add-on child restraints are available in four basic types. When selecting a child restraint, take into consideration not only the child's weight and size, but also whether or not the restraint will be compatible with the motor vehicle in which it will be used.

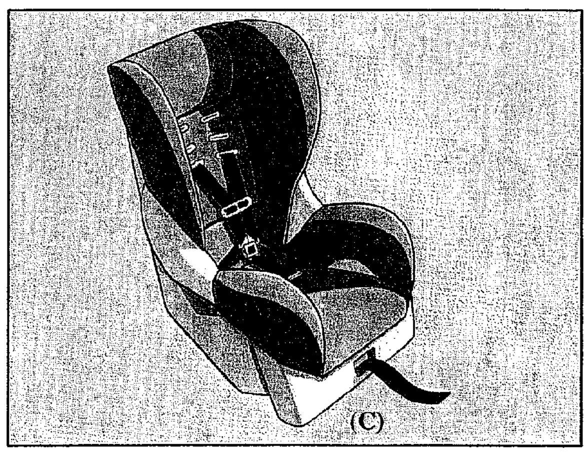


(A)

An infant car bed (A) is a special bed made for use in a motor vehicle. It's an infant restraint system designed to restrain or position a child on a continuous flat surface. With an infant car bed, make sure that the infant's head rests toward the center of the vehicle.

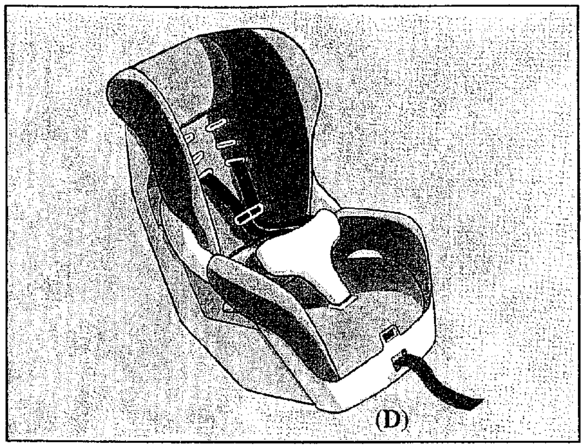


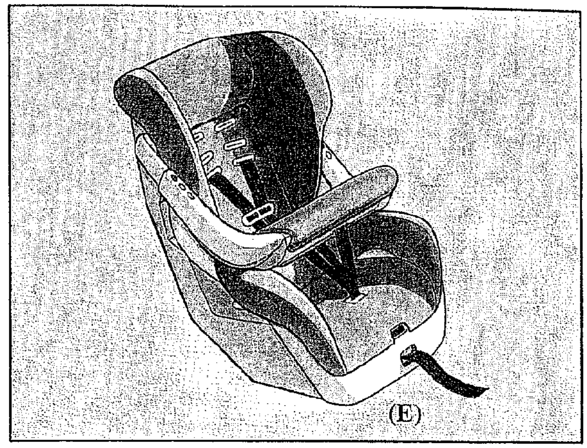
(B)



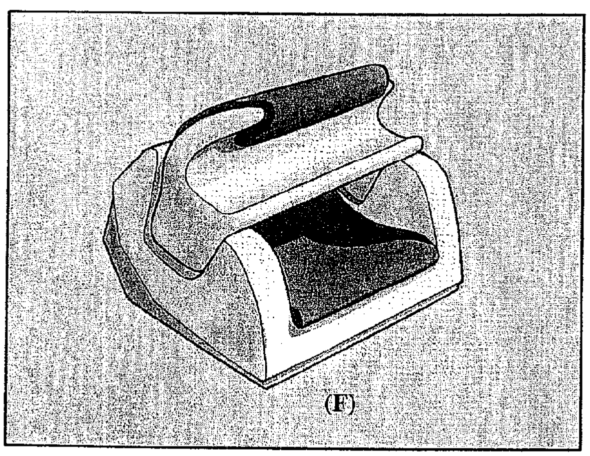
(C)

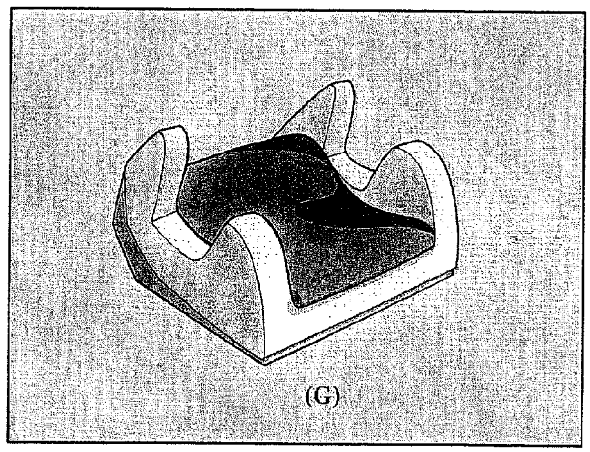
A rear-facing infant restraint (B) positions an infant to face the rear of the vehicle. Rear-facing infant restraints are designed for infants of up to about 20 lbs. (9 kg) and about one year of age. This type of restraint faces the rear so that the infant's head, neck and body can have the support they need in a crash. Some infant seats come in two parts -- the base stays secured in the vehicle and the seat part is removable.





A forward-facing child restraint (C-E) positions a child upright to face forward in the vehicle. These forward-facing restraints are designed to help protect children who are from 20 to 40 lbs. (9 to 18 kg) and about 26 to 40 inches (66 to 102 cm) in height, or up to around four years of age. One type, a convertible restraint, is designed to be used either as a rear-facing infant seat or a forward-facing child seat.





A booster seat (F, G) is designed for children who are about 40 to 60 lbs. (18 to 27 kg) and about four to eight years of age. It's designed to improve the fit of the vehicle's safety belt system. Booster seats with shields use lap-only belts; however, booster seats without shields use lap-shoulder belts. Booster seats can also help a child to see out the window.

When choosing a child restraint, be sure the child restraint is designed to be used in a vehicle. If it is, it will have a label saying that it meets Federal Motor Vehicle Safety Standards.

Then follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. The instructions that come with the infant or child restraint will show you how to do that. Both the owner's manual and the child restraint instructions are important, so if either one of these is not available, obtain a replacement copy from the manufacturer.

Where to Put the Restraint

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. We at General Motors therefore recommend that you put your child restraint in the rear seat. *Never* put a rear-facing child restraint in the front passenger seat. Here's why:

⚠ CAUTION:

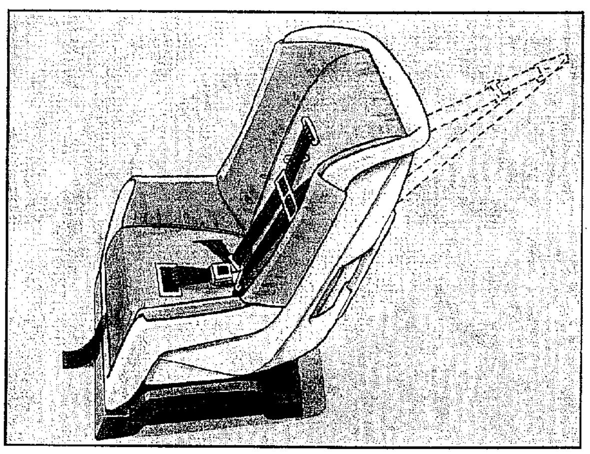
A child in a rear-facing child restraint can be seriously injured if the right front passenger's air bag inflates, even if your vehicle has reduced-force frontal air bags. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in a rear seat.

You may secure a forward-facing child restraint in the right front seat, but before you do, always move the front passenger seat as far back as it will go. It's better to secure the child restraint in a rear seat.

Wherever you install it, be sure to secure the child restraint properly.

Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle -- even when no child is in it.

Top Strap

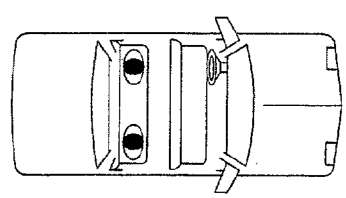


If your child restraint has a top strap, it should be anchored. If you need to have an anchor installed, you can ask your Oldsmobile retailer to put it in for you. If you want to install an anchor yourself, your retailer can tell you how to do it.

Canadian law requires that child restraints have a top strap, and that the strap be anchored.

If your child restraint has a top strap, your retailer can obtain a kit with anchor hardware and installation instructions specifically designed for this vehicle. The retailer can then install the anchor for you. In Canada, this work will be done for you free of charge. Or, you may install the anchor yourself using the instructions provided in the kit.

Securing a Child Restraint in a Rear Outside Seat Position

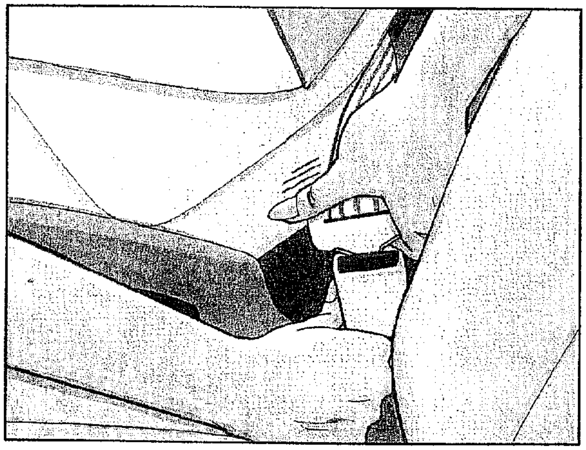


You'll be using the lap-shoulder belt. See the earlier part about the top strap if the child restraint has one. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

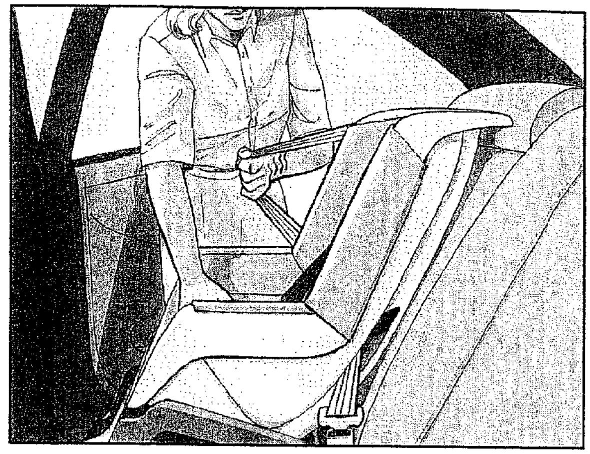
1. Put the restraint on the seat.

2. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

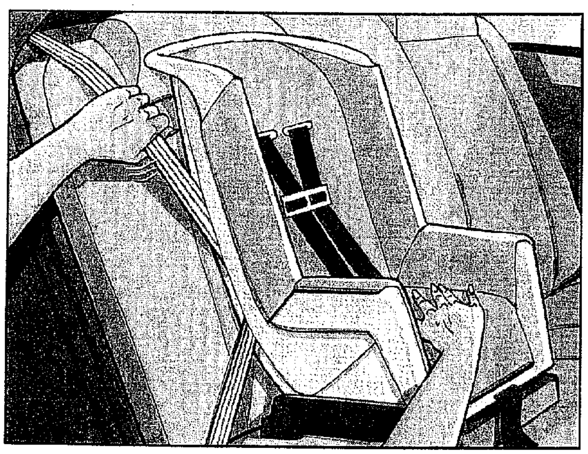
   If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint.



3. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



4. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.

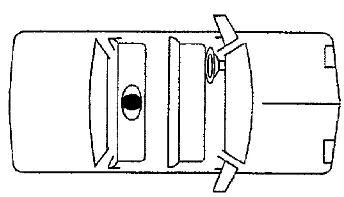


5. To tighten the belt, feed the shoulder belt back into the retractor while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.

6. Push and pull the child restraint in different directions to be sure it is secure.

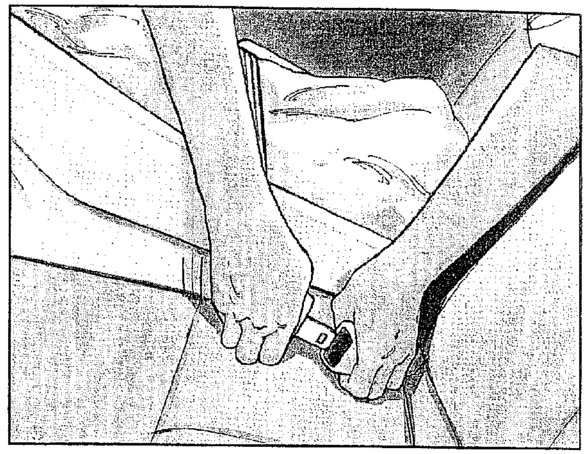
To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

Securing a Child Restraint in the Center Rear Seat Position



You'll be using the lap belt. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

See the earlier part about the top strap if the child restraint has one.

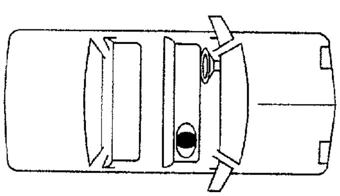


1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.
2. Put the restraint on the seat.
3. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.
4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.
5. To tighten the belt, pull its free end while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.

6. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.

Securing a Child Restraint in the Right Front Seat Position



Your vehicle has a right front passenger air bag. *Never* put a rear-facing child restraint in this seat. Here's why:

⚠ CAUTION:

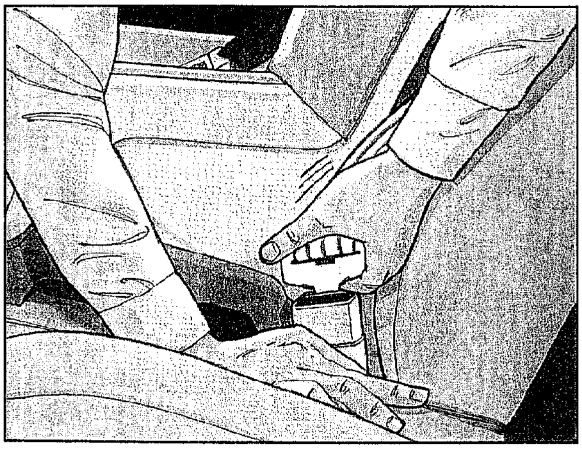
A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger's air bag inflates, even if your vehicle has reduced-force frontal air bags. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in the rear seat.

You'll be using the lap-shoulder belt. See the earlier part about the top strap if the child restraint has one. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

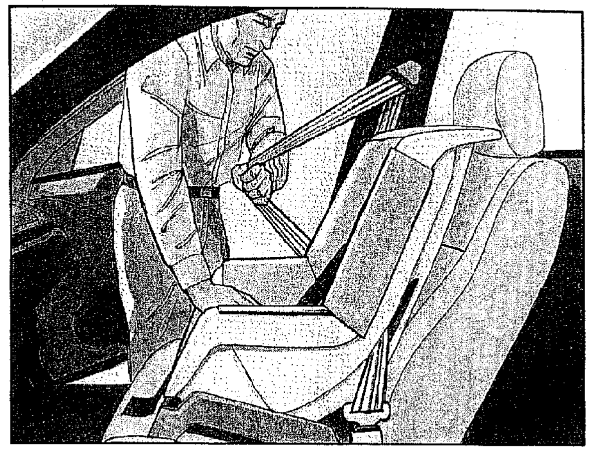
1. Because your vehicle has a right front passenger air bag, always move the seat as far back as it will go before securing a forward-facing child restraint. (See "Seats" in the Index.)
2. Put the restraint on the seat.

3. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

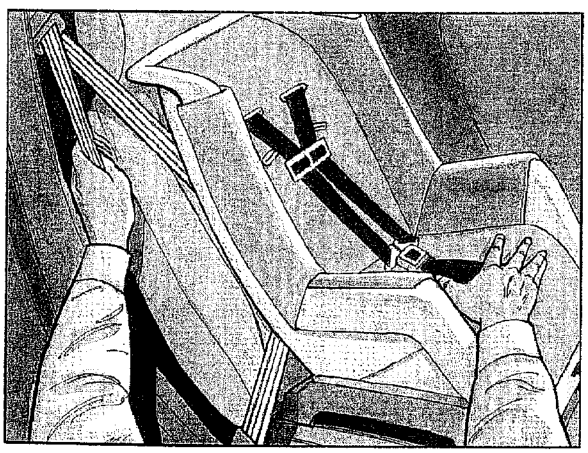
   If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint.



4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



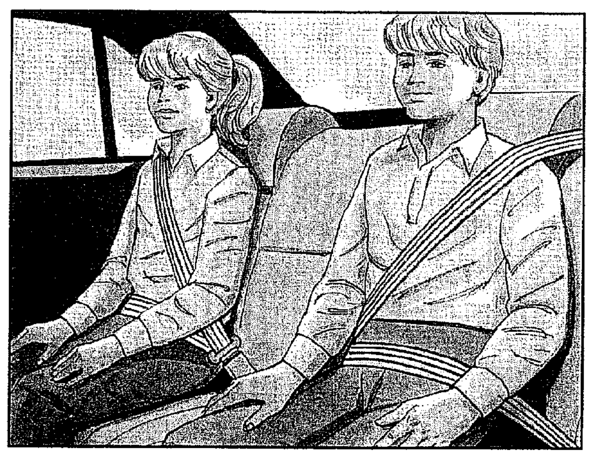
5. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.



6. To tighten the belt, feed the shoulder belt back into the retractor while you push down on the child restraint. You may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

Larger Children

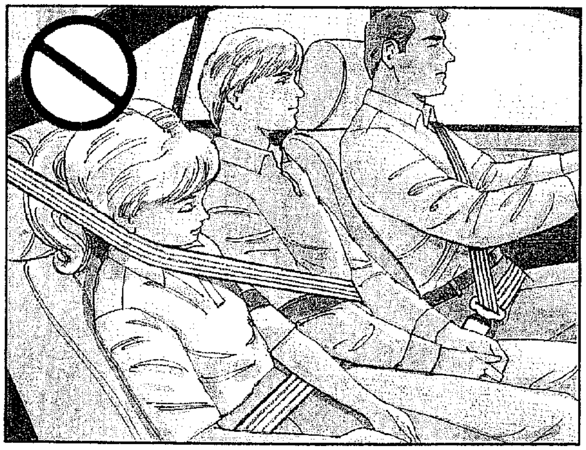


Children who have outgrown child restraints should wear the vehicle's safety belts.

If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide.

Accident statistics show that children are safer if they are restrained in the rear seat. But they need to use the safety belts properly.

- Children who aren't buckled up can be thrown out in a crash.
- Children who aren't buckled up can strike other people who are.



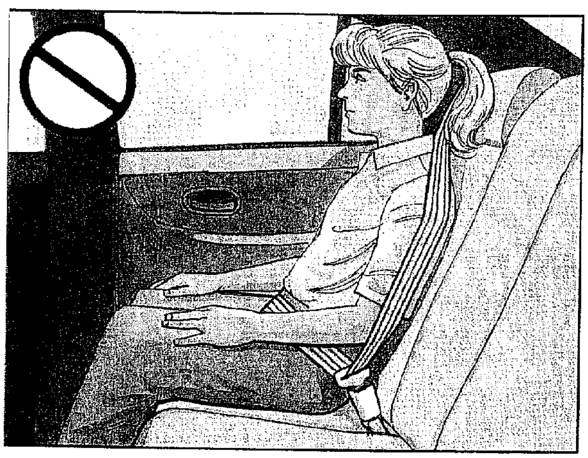
⚠ CAUTION:

Never do this.

Here two children are wearing the same belt. The belt can't properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A belt must be used by only one person at a time.

Q: What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

A: Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide. If the child is sitting in a rear seat outside position, see "Rear Safety Belt Comfort Guides" in the Index. If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in the center seat position, the one that has only a lap belt.



⚠ CAUTION:

Never do this.

Here a child is sitting in a seat that has a lap-shoulder belt, but the shoulder part is behind the child. If the child wears the belt in this way, in a crash the child might slide under the belt. The belt's force would then be applied right on the child's abdomen. That could cause serious or fatal injuries.

Wherever the child sits, the lap portion of the belt should be worn low and snug on the hips, just touching the child's thighs. This applies belt force to the child's pelvic bones in a crash.

Safety Belt Extender

If the vehicle's safety belt will fasten around you, you should use it.

But if a safety belt isn't long enough to fasten, your retailer will order you an extender. It's free. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. The extender will be just for you, and just for the seat in your vehicle that you choose. Don't let someone else use it, and use it only for the seat it is made to fit. To wear it, just attach it to the regular safety belt.

Checking Your Restraint Systems

Now and then, make sure the safety belt reminder light and all your belts, buckles, latch plates, retractors and anchorages are working properly. Look for any other loose or damaged safety belt system parts. If you see anything that might keep a safety belt system from doing its job, have it repaired.

Torn or frayed safety belts may not protect you in a crash. They can rip apart under impact forces. If a belt is torn or frayed, get a new one right away.

Also look for any opened or broken air bag covers, and have them repaired or replaced. (The air bag system does not need regular maintenance.)

Replacing Restraint System Parts After a Crash

If you've had a crash, do you need new belts?

After a very minor collision, nothing may be necessary. But if the belts were stretched, as they would be if worn during a more severe crash, then you need new belts.

If belts are cut or damaged, replace them. Collision damage also may mean you will need to have safety belt or seat parts repaired or replaced. New parts and repairs may be necessary even if the belt wasn't being used at the time of the collision.

If an air bag inflates, you'll need to replace air bag system parts. See the part on the air bag system earlier in this section.